TABLE OF CONTENTS.

	Page
Statement of the Case	1
The Grant Patent	7
The Grant Tire	7
Copy of Grant Letters Patent No. 554,675, dated February 18, 1896	8
Complainants' Diagram of Rubber Tires	13
The Supremacy of the Grant Tire	14
The Requirements of a Solid Rubber Tire	22
The Prior Art	26
Grant's Tire is Not an Aggregation	36
The Grant Tire is a Patentable Combination	39
Qualities Inherent in the Grant Tire	45
I.— Capacity of Grant tire to tip	48
II.— Grant tire yields and tips under the influence of side strains	52
III.— Ability of the Grant tire to move and tip in its channel and cushion the lateral blows	55
Defendant's Contentions as to Tipping	58
The Opinion of the Court of Appeals for the Sixth Circuit	64
The Opinions of the Court of Appeals for the Second Circuit	69
Infringement	74
Conclusion	77
Addenda	79

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1910.

No. 36.

DIAMOND RUBBER COMPANY OF NEW YORK,
PETITIONER, DEFENDANT,
v.
CONSOLIDATED RUBBER TIRE CO. ET AL.,
RESPONDENT, COMPLAINANT.

BRIEF FOR RESPONDENT, COMPLAINANT.

STATEMENT OF THE CASE.

This cause is brought by writ of *certiorari* to this Honorable Court from the United States Circuit Court of Appeals for the Second Circuit, whose decision affirmed Judge Holt's decree in the United States Circuit Court, Southern District of New York, holding the Grant patent No. 554,675 valid and infringed.

The patent to Grant in suit is for a "Rubber-Tired Wheel", which, since the date of its invention early in April, 1894, has achieved absolute supremacy for use on wheels of horse-drawn vehicles of the lighter type, such as carriages for commercial and pleasure use, cabs, delivery wagons and the like, the wheels of which are subjected to rough use on city streets.*

The Grant tire was the first commercially successful "solid rubber" tire. It has the distinction, almost unique

*The broad, low, flat, solid rubber tires which have recently gone into use on heavy auto and other trucks do not involve the invention of the Grant patent.

among inventions, of having been introduced into use in the exact specific form shown and described in the patent even in matters of shape and minute detail. Prior to the invention, there has been no solid rubber tires in use on vehicles except occasionally and in an experimental fashion. The Grant tire immediately took the market and from the time of its introduction to the present day it has been the only useful solid rubber tire for the lighter vehicles such as carriages, etc. As we shall show hereafter, no tire that did not copy that of the Grant patent has proved even serviceable for the particular class of vehicles for which the Grant tire is adapted. The patent has been extensively infringed in spite of the most strenuous efforts on the part of the owners of the patent to enforce their rights. There have been repeated decisions sustaining the patent. There has been every temptation for those who would manufacture tires to find some other construction. The interest of such outside manufacturers to evade the patent by departing from some of the details of the patented arrangement has been the greatest possible. The claims are so specific that there was every temptation to try to evade them; but every single infringer has copied the structure set out in the claims in the most slavish fashion.

These considerations are certainly significant. Why is it that there should have been no commercially successful solid rubber tire, either before or since the date of Grant's invention, except his tire and tires that are practically Chinese copies of the construction, shape and arrangement shown in his drawings and specifically set out in the apparently narrow claims of the patent? There can be but one answer to this question. *The patented organization must be one that is essential. Its use in the precise form described and shown in the patent must be inevitably necessary.* Later in the brief we shall show why it is that such is the case.

For several generations it has been recognized that

rubber tires for vehicles would be a most useful improvement, if a proper tire could be devised. It is no exaggeration to say that the use of such tires, which is now most extensive, adds enormously to the comfort of those who ride. More than that, the presence of the rubber tire results in substantial economy, for the wear and tear of vehicles is nothing like as great when there is a cushion between them and the roadway, reducing to a large extent the jar, pounding and shock which is so destructive to vehicles that have no rubber tires. But the problem was obviously one of the greatest difficulty, as is shown by the large number of patents prior to Grant, none of which show or suggest structures that went into use on horse drawn vehicles.

Rubber tires first went into general use on bicycles. Here the problem was extremely simple. A bicycle has one wheel following the other. Its track is in width only that of the wheel. The rider picks his way, avoiding stones and obstacles, keeping out of the street car tracks and ruts, and generally selecting from moment to moment, for the path of his wheel, the best spot on the road. If he was not careful so to do, he would be very sure to fall.

In the case of vehicles having four wheels, the situation is very different. The driver does not and cannot give anything like the same attention to the path he takes as can and does the bicycle rider. More than that, the vehicle has a pair of wheels on each side, and if the utmost pains were taken to select the best path on the roadway for the wheels on the left-hand side of the vehicle, those on the right-hand side might be in serious trouble. If a smooth track were selected for those on the right-hand side, those on the left-hand side might be advancing on or over the edge of a street car track, over the corners of cobblestones, in a gutter or rut, or over an obstacle of substantial size in the highway.

The tires of bicycles were for many years of solid rubber

and strongly cemented to the rim. The only pressure on those tires was the vertical pressure between the bicycle and the roadway. There was no lateral strain on the tires.*

With horse drawn vehicles, however, except in rare instances where there is a perfectly smooth roadway, there is constantly the most violent lateral strain, first in one direction and then in the other, on the projecting solid rubber tires. On ordinary highways the conditions are such that very frequently a cobblestone or of an obstacle in the road, the edge of a Belgian block, the rail of a street car track or a rut, may bear against the side of the exposed portion of the rubber tire with a tremendous lateral strain, due not only to the weight of the vehicle but to the pull of the horses. Under these conditions there is the greatest danger that the tire will be forced off the wheel, which results in disabling the vehicle. The history of the solid rubber tire shows that there is no method of attaching it to a wheel which *in and of itself* is strong enough to overcome this danger. A great merit of the Grant invention is that it does not rely merely upon the strength and rigidity of the attachment. His tire is *not* rigidly attached to the wheel. On the contrary, it is flexibly attached. It is in a sense a floating tire because it is flexibly attached and as it were "floats". For this reason, largely, it met the difficulties of the situation. It is, to be sure, strongly held on the wheel by a peculiar fastening consisting of two tightly drawn wires embedded in the rubber and united at their ends. But these two wires are effective as holding contrivances only because of the peculiar shape of the parts, and the specific arrangement of the construction as a whole and the relation of the several parts to each other. The

*Afterwards inflated pneumatic tires were extensively used on bicycles and the tires employed today on automobiles are pneumatic. Substantially all the lighter horse-drawn vehicles, however, have the solid rubber tires, to which alone the Grant patent relates; and they are all of the Grant form and construction.

Grant patent is for a *combination*, an *organization*, in which by reason of the special form and shape of the elements, their refined relation, each to the other, and their intelligent and novel correlation, the important result of the first and only practicable solid rubber tire has been realized.

As early as 1898, but two years after the issue of the Grant patent, Judge Thomas in the suit of *Rubber Tire Wheel Company* v. *Columbia Pneumatic Company*, 91 Fed. 978, sustained the Grant patent against every prior patent and prior reference which is now urged upon this Court as ground for invalidity. Not a single new prior reference of the least importance has appeared since this first case except the Latta patent, which was effectively disposed of as an anticipation by the Court of Appeals for the Second Circuit in the *Firestone Case*, 151 Fed. 237, and which is not relied on by the defendant in this case with any force.

The Grant patent has also been sustained in the following cases:

Consolidated Rubber Tire Co. v. *Finley Rubber Co.*, Newman, J., 116 Fed. 629;

An unreported case decided by Judge Wing, referred to by Judge Newman in the above cited case;

Consolidated Rubber Tire Co. v. *Firestone Tire & Rubber Co.*, Platt, J., 147 Fed. 739;

Same case on appeal, Circuit Court of Appeals for the Second Circuit, 151 Fed. 237 (known as the Firestone case).

The Grant patent was also sustained by Judge Holt in the case at bar in the Circuit Court (Rec. p. 671) and by the Circuit Court of Appeals for the Second Circuit (162 Fed. 892 and Rec. pp. 683–693).

In *Rubber Tire Wheel Co.* v. *Milwaukee Co.*, 154 Fed. 359, the patent was also involved and assumed to be valid.

The patent was held invalid by the Court of Appeals for

the Sixth Circuit in *Goodyear Tire and Rubber Co.* v. *Rubber Tire Wheel Co.*, 116 Fed. 363, and again by the same court in the Victor case, 123 Fed. 825. This decision was followed by Judge Anderson in the Seventh Circuit by dismissing the suit known as the Kokomo case (unreported).

When the Grant patent was before the Court of Appeals for the Second Circuit in the Firestone case, 151 Fed. 237, that Court had before it the decisions of the Court of Appeals for the Sixth Circuit holding the patent invalid. In this case the Court of Appeals for the Second Circuit said (p. 239):

> "It now appears that the feature which secures patentability is inherent in the patent, and the specification is so clear and explicit that no intelligent mechanic can follow Grant's directions without securing the tipping action which inheres in no other tire. This feature is neither an accident nor 'an obscure property'; it exists in every wheel on which is mounted a tire which follows the teaching of the patent. In view of this new aspect of the case *we have no reason to doubt that on the present record the Court of Appeals of the Sixth Circuit would reach a result favorable to the patent.*"

The record in the Firestone case is by stipulation made a part of the record in this case before this Court. It supplies the facts for the lack of which the Court of Appeals for the Sixth Circuit in the Goodyear case thought the patent invalid.

On the record presented to this Court there have been no differences of opinion as to the validity of the Grant patent.

As Judge Coxe, speaking for the Court of Appeals for the Second Circuit in this case, well said (162 Fed. 893, Rec. p. 683):

"Another volume of 500 pages has been added to the library which has accumulated during the last ten years through the efforts of many defendants who seem determined to use what they, in effect, assert to be a useless device. The indomitable persistency with which these people have fought for the right to use the Grant tire is more persuasive evidence of its merits than the opinions of experts."

No manufacturer of solid rubber tires has ever been able to escape the burden of litigation under the Grant patent by the simple expedient of evading the claims of the patent.

THE GRANT PATENT.

We have inserted a copy of the Grant patent at this point in the brief, and request the court to read the patent, as it is short and simple and clearly describes the exact construction of the Grant tire, which, since the date of its introduction to the commercial world in 1894 as the Kelly Springfield tire, has proved the only satisfactory tire of its class.

One of defendant's witnesses, in the livery business in New York for forty years, said, page 504:

"It is like the telephone, you can't do without them."

THE GRANT TIRE.

The Grant tire is composed of three elements; First, the channel; second, the rubber tire, and third, the fastening device. It is the specific shape and the arrangement and inter-relation of these parts among one another, exactly as described and shown in the patent, which give the tire its vitality and wonderful usefulness. There has been substantially no departure from this specific shape and definite organization in any solid rubber tire for the lighter type of horse drawn vehicles which has ever gone into successful commercial use.

(No Model.)

A. W. GRANT.

RUBBER TIRED WHEEL.

No. 554,675. Patented Feb. 18, 1896.

Fig 1

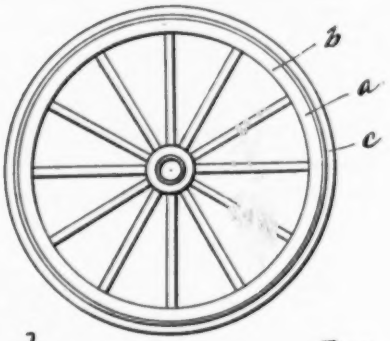


Fig 1c

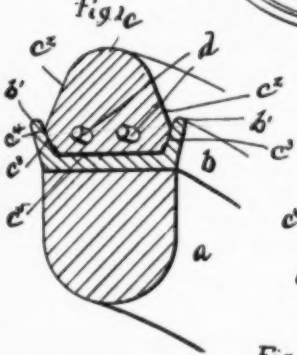


Fig 4.

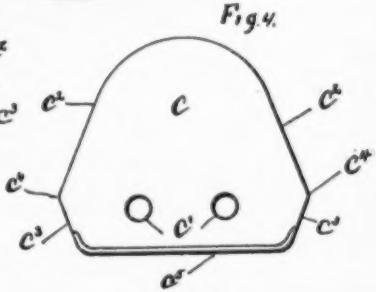
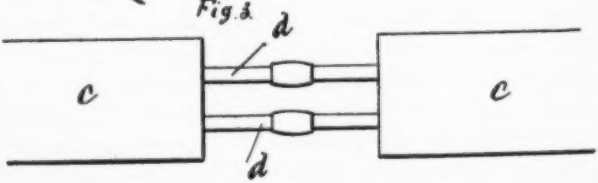


Fig 3.



Witnesses
Chas. J. Walch
F. L. Walker

Inventor
Arthur W. Grant
By his Attorney
Chas. A. Walch

UNITED STATES PATENT OFFICE.

ARTHUR W. GRANT, OF SPRINGFIELD, OHIO.

RUBBER-TIRED WHEEL.

SPECIFICATION forming part of Letters Patent No. 554,675, dated February 18, 1896.

Application filed November 14, 1895. Serial No. 568,923. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR W. GRANT, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Rubber-Tired Wheels, of which the following is a specification:

My invention relates to improvements in rubber-tired wheels, and it especially relates to wheels designed for use on ordinary vehicles, such as wagons, buggies, and carriages.

My invention consists in the constructions and combinations of parts hereinafter described and set forth in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a wheel embodying my invention. Fig. 2 is a sectional elevation of the wheel-rim, shown partly in perspective. Fig. 3 is a partial longitudinal section through the tire, showing the openings for the retaining-wires. Fig. 4 is a transverse sectional view of the rubber tire in detail.

Like parts are represented by similar letters of reference in the several views.

In constructing my improved rubber tire, I take an ordinary vehicle-wheel preferably with a plain wooden felly *a*, and to this wooden felly *a* I secure a metallic rim *b*, having at its edges outwardly-projecting flanges *b'*. These flanges *b'* extend outwardly from the rim *b* at an angle, so as to form a groove or channel having tapered or beveled sides, with the bottom of said groove or channel smaller in cross-section than the top. In this groove or channel I place a rubber tire *c*, which is of peculiar shape. This rubber tire is formed preferably of a single piece, but not continuous. It is provided throughout its length with openings c' c', through which are passed retaining-wires *d*. These retaining-wires are separate and independent and extend entirely through the openings c', and the ends of each of said retaining-wires are united together after the rubber has been compressed endwise on said wires, thus forming two independent and continuous retaining-wires within the rubber tire, the ends of which, by reason of the compression, are brought together so as to entirely cover the wires and the united ends thereof.

The tire proper, *c*, is formed of substantially the same depth as width. The outer periphery, however, is formed on the arc of a circle of much smaller diameter than the width of the rim, the exposed sides of the tire being formed preferably on the lines c^2 at an angle to each other and also to the flanges b' of the wheel-rim. The unexposed portion of the tire, or that portion which is inclosed within the rim, is formed of substantially the same shape as the inner channel of the rim — that is to say, it is tapered from the outside inwardly — so that the sides of the inner or unexposed portion of the tire are also formed on the lines c^3, forming with the lines c^2 an obtuse angle. The lines c^3, however, are less in length than the inside of the flanges b', so that the angle or corner c^4 between the sides c^2 and c^3 falls below the outer periphery of

the flange b' and within the channel between said flanges. The openings c' through which the retaining-wires pass are also formed within the inner or unexposed portion of the tire—that is to say, the tops of the openings are substantially on a line with the angle or corner c^4, so that the tops of said openings stand below the outer periphery of the flanges b'.

The bottom portion of the tire is reinforced with a canvas strip c^5, which covers the entire bottom and may project slightly along the sides c^3, but does not in any case extend up as far as the angle or corner c^4.

The tire has been described thus minutely because the constructions described are important. By having the sides of the exposed and unexposed portion of the tire formed inclined and at an angle to each other, as described, the compression of the tire in use is such that all portions of the rubber are retained within the channel or groove and no portion of the rubber is forced over the side of the flange, which would result in cutting or grooving the tire at the corner or angle, which would eventually cause the tire to break from this point inwardly to the openings c'. The reinforcing of the bottom of the tire by the canvas strip, which may be formed into the rubber, is desirable, as it has a tendency to prevent the breaking of the rubber below that portion of the tire which is between the retaining-wires and the rim. At the same time, by having the canvas strip wholly within the rim, all danger of stripping the edge of the canvas from the rubber, which would eventually result in a fracture of the rubber to the opening c' is prevented.

It has been found in practice that by the constructions above described I produce a rubber-tired wheel-rim which is capable of more use and which will remain in position better than any other tire which has ever been put upon the market.

Having thus described my invention, I claim,—

1. A vehicle-wheel having a metallic rim with angularly-projecting flanges to form a channel or groove with tapered or inclined sides, a rubber tire, the inner portion of which is adapted to fit in said groove or channel and the outer portion having sides at an angle to the inner portion, the angle or corner between the outer and inner portions being located within the outer periphery of the flanges, and independent retaining-wires passing entirely through the inner portions of said tire and also within the outer peripheries of the flanges, substantially as described.

2. A vehicle-wheel having a metallic rim with outwardly-projecting flanges at an angle to the plane of said wheel so as to form a channel or groove having tapered or inclined sides, a rubber tire, the inner portion of which is adapted to fit in said tapered groove or channel, and the outer or exposed portions formed at an angle thereto, the angle or corner between the said portions being placed within the outer periphery of said flanges, openings extending entirely through the unexposed portion of said tire, and independent retaining-wires in said openings, and a reinforcing-strip of fibrous material placed at the bottom of said tire and wholly within said flanges, substantially as specified.

In testimony whereof I have hereunto set my hand this 7th day of November, A. D. 1895.

ARTHUR W. GRANT.

Witnesses.
W. S. HUFFMAN,
E. P. CHRISTIE.

The channel b is provided with two outwardly flaring flanges, b^1.

The bottom of the tire c rests on the bottom of the channel and the flaring sides of the rubber seat against the flaring flanges of the channel, but do not extend to the periphery of the flanges. The angle of the tire at c^4 is an obtuse angle. The part c^3 below that angle is the inner or unexposed portion, and the part c^2 above the angle is the outer or exposed portion. The tire is provided at its bottom and partially on the sides of the inner portion with a strip of canvas, c^5, for the purpose of giving added strength.

The fastening device consists of two wires, d, passing through holes, c^1, in the tire, the wires d lying below the outer periphery of the flanges of the channel, and hence within the inner or unexposed portion of the tire.

In actual commercial practice the rubber tire is applied to the wheel by wrapping around the wheel and in the channel a length of tire with the two wires, of a length suitable to surround the wheel, enclosed in the holes therein. The ends of the rubber are pressed back and the wires drawn together either by hand or by machinery as tightly as possible. The ends of the wires are secured together, usually by welding or brazing. The ends of the rubber are then forced back over the wires so as to meet and form a continuous annular tire. (Ernenwein, Rec. p. 51, Q. 16; Roberts, p. 58, Q. 19.)

The two claims of the Grant patent, both of which are in issue, accurately define the Grant structure, and are as follows:

> "1. A vehicle-wheel having a metallic rim with angularly-projecting flanges to form a channel or groove with tapered or inclined sides, a rubber tire, the inner portion of which is adapted to fit in said groove or channel and the outer portion having sides at an angle

to the inner portion, the angle or corner between the outer and inner portions being located within the outer periphery of the flanges, and independent retaining-wires passing entirely through the inner portions of said tire and also within the outer peripheries of the flanges, substantially as described.

"2. A vehicle-wheel having a metallic rim with outwardly-projecting flanges at an angle to the plane of said wheel so as to form a channel or groove having tapered or inclined sides, a rubber tire, the inner portion of which is adapted to fit in said tapered groove or channel, and the outer or exposed portions formed at an angle thereto, the angle or corner between the said portions being placed within the outer periphery of said flanges, openings extending entirely through the unexposed portion of said tire, and independent retaining-wires in said openings, and a reinforcing strip of fibrous material placed at the bottom of said tire and wholly within said flanges, substantially as specified."

These claims of the Grant patent are narrow claims, limited closely to the specific construction of the Grant tire as it is actually shown and described in the patent. We do not ask this Court to broaden the claims of the Grant patent or to apply the doctrine of mechanical equivalents. No such question arises in this case. The defendant's tire follows line for line the details of the Grant tire.

How vital are the details of the construction of the combination of the elements of the Grant patent is shown by two facts: First, the failure of the many tires prior to Grant which did not have the combination of the Grant patent; and, second, the fact that the only tires subsequent to Grant which have been successful or even useful are tires which have copied the Grant tire in the specific details of construction. All others have been failures.

COMPLAINANT'S DIAGRAM OF RUBBER TIRES.

We call the Court's attention to the "Complainant's Diagram of Rubber Tires", which on the left-hand side shows the entire art prior to Grant's invention which is disclosed in the Record; in the middle are shown the tire of Grant's patent and the defendant's tire; and on the right-hand side is shown the entire art subsequent to Grant's invention, that is to say the tires since the Grant patent which, according to the record, have been used or attempted to be used.

In this diagram of the prior art there are shown the rubber tires of twenty-five prior patents. None of these ever went into use to any appreciable extent; there were practically no solid rubber tires on horse drawn vehicles prior to the Grant invention.

It is admitted by complainant's experts and counsel that there is no one patent in this prior art which shows or describes the combination of elements found in the Grant patent. The prior patents show almost every conceivable form of channel, shape of tire and method of attachment, except the right combination, which was first discovered by Grant. All kinds of channels are shown: some with inwardly converging flanges; some with perpendicular flanges; some with outwardly flaring flanges; some with curved flanges; some with straight flanges and some with no flanges at all. Tires of all kinds of cross-sectional shapes are shown in the prior art: circular; semi-circular; elliptical; triangular; heart-shaped; V-shaped; square; horse-shoe shaped; wedge-shaped and flat. Many kinds of fastenings are shown for holding the tire rigidly in its channel. The principal fastening is cement, and in some cases metal bands or wires are used in addition to the cement. But in no case is Grant's combination of specific channel, rubber and two wires, as shown in the Grant patent, found in the prior art.

No one asserts that any one of these prior tires is of any commercial value. There is not one such tire on the market today. They have all proved failures and then displaced by the Grant tire.

Turn now to the "subsequent art" on "Complainant's Diagram of Rubber Tires". Here are shown some eighteen forms of tires. Of these the Kokomo No. 1, Firestone No. 2 and No. 14, Goodyear No. 3 and No. 4, Victor No. 5 Hartford No. 6, Morgan & Wright two-wire tire No. 8, Batavia No. 9, American No. 10, Inter-national No. 12, Wemaka two-wire tire No. 13 and Standard No. 15 are copies of the Grant tire and are in commercial use today.

The New England tire No 7, the Morgan & Wright band tire No. 11, the Whitman & Barnes tire No. 16, the Calumet No. 17 and the Wemaka tire, with a single wire, No. 18, are each different from the Grant tire in some vital respects, and the use of each has been abondoned and the tire of the specific form shown in the Grant patent has been substituted in its place. Nothing has succeeded except the precise Grant construction following every detail set forth in the claims of his patent.

THE SUPREMACY OF THE GRANT TIRE.

The history of rubber tires for horse-drawn vehicles is given by Van Cartmell, record, page 773, in a deposition given in the Firestone case and made part of this record by stipulation. The deposition is short, and as it gives clearly the history of the development of the Grant tire and the failure of its competitors, we ask the court to read it. Mr. Van Cartmell has been in the rubber tire business continuously since the fall of 1894.

On cross-examination he makes the following significant statement (Rec. p. 777):

> "X-Q. 28. In other words, practically all of the manufacturers of rubber tires in the country are and

have been substantially, ever since the decision of the Circuit Court of Appeals in the Goodyear case, making tires which you consider come within the Grant patent. Is that so?

A. Yes, sir."

This is not denied by the defendant.

All efforts to make a tire for use on the class of vehicles for which the Grant tire is adapted, which is not the Grant tire, have been abandoned, as shown by Mr. Van Cartmell in answer Q. 8 to Q. 20.

The Whitman and Barnes tire (No. 16 in the group marked "Subsequent Art" on the "Diagram of Rubber Tires") was substantially the first tire to compete with the Grant tire. As described by Mr. Van Cartmell, the rubber was cemented in the channel, and an attempt was made to hold it there by a single wire. At first it had some success because of its neat appearance, but it was found that —

> "within a few months the rubber would separate from the metal and as soon as it started to separate, say, a few inches, it was then a matter of but a few hours if the wheel was in use when the tire would be off." (Van Cartmell, Rec. p. 774.)

The Whitman and Barnes tire was abandoned after eight or ten months' use, although it was extensively advertised and pushed in New York, Brooklyn and Boston.

Other forms of tires in which it was attempted to avoid the Grant patent by the use of single bands as fastening means, instead of two wires, as in the Grant tire, were the New England tire (No. 7) and the Morgan & Wright tire (No. 11). Both of these tires proved failures in actual use and disappeared from the market. (Van Cartmell, Rec. p. 775.) Another form of tire with a single band fastening was the Calumet (No. 17), but the method of application failed to give satisfaction and its manufacture was given up. (Van Cartmell, Rec. p. 776.)

The Wemaka tire No. 18, with a single wire for a fastening, was also soon abandoned. (Van Cartmell, Rec. p. 776.)

An effort was made by the American Company to avoid the Grant patent by the use of a tire in which the rubber had a lip extending over the flange of the channel. It was called "The American Lip Tire". (See diagram, Rec. p. 791.) This tire went to pieces within a few weeks, not to exceed three or four in some cases, and the tire has disappeared from the market. (Van Cartmell, Rec. p. 775.)

The American Company also tried to avoid the Grant patent by raising the wires above the shoulder or angle between the inner and outer portions of the tire and above the periphery of the flanges.

> "This tire, as I remember it, proved a failure within a few months, and the wires or holes were again placed within the periphery of the channel." (Van Cartmell, Rec. p. 775.)

The Revere Rubber Company made a tire known as the "Langmuir Tire", in which it is attempted to avoid the Grant patent by making the sides of the rubber straight, or, in other words, dispensing with the formation of the corner or angle of the rubber near the top of the flange, but still using the retaining wires and flaring channel iron. As this tire was widest at the bottom, it left a V-shaped space between the channel and the rubber on either side. The manufacture of this tire was abandoned in 1901, and it has not been on the market since. (Van Cartmell, Rec. p. 776.)

The absolute supremacy of the Grant tire is also proved by the defendant's witnesses produced both in the Firestone case and in the case at bar.

Harvey S. Firestone, the president of the Firestone Company, testified in 1905 that the Grant tire "did represent the prevalent form of internal wire tire" (Rec. p. 851, X-Q. 25), and that a tire "of this style was sold very

largely" and "known as the Kelly Springfield tire" (X-Q. 26). He also admitted that the Calumet Rubber Tire Company "have entirely given up the manufacture" of the Calumet tire, and he further testified as follows (Rec. p. 853):

> "RD-Q. 36. And is it not a fact that practically all manufacturers of solid rubber tires in this country are making and selling tires with two internal wires and substantially like the 'Complainant's Exhibit Kelly Internal Wire Tire'?
>
> A. To the best of my knowledge they are."

The defendants in this case and in the Firestone case produced many hack men and livery stable keepers, who have had experience in the use of rubber tires on horse drawn vehicles. They all testify to the universal use of the Grant tire and the abandonment of all other kinds of tires. We quote from the testimony of defendant's practical witnesses:

THOMAS G. BRODERICK, Rec. p. 232:

> "I should judge it is about eleven years ago when we commenced to put on the Kelly tire; that was the first we put on."

Rec. p. 246:

> "X-Q. 106. What became of the Hartford one-wire tire?
>
> A. They discarded that and made a two-wire."

Rec. p. 247:

> "A. Yes, I know they all quit the flat band and all other types of single wire.
>
> X-Q. 108. Except like the Kelly tire?
>
> A. Yes, that is the only tire there is now with two wires, the same as the tire in suit."

OMAIRE J. DUHAMEL, Rec. p. 264:

"A. No, sir; but prior to that we had tires put on in Boston by the Boston Rubber Company, and they were cemented on, and those were the first tires we put on.

X-Q. 38. Prior to when?

A. 1899.

X-Q. 39. And when did you abandon the cemented-on tires?

A. About three years later."

Rec. p. 265:

X-Q. 48. *Did you abandon the use of the cemented-on tires because they were unsatisfactory?*

A. *Yes, sir.*"

LOUIS KUEHNE, Rec. p. 281:

"X-Q. 37. Was that a tire known as the 'English or clincher tire', and handled by Kimball and some large concerns in Chicago?

A. That is the one I referred to.

X-Q. 38. When was that?

A. About '91 or '92.

X-Q. 39. When did the tire cease to be handled in Chicago, before or after the Rubber Tire Wheel Company started?

A. I can't say as to that. *I don't think there was any more of those tires used after the Rubber Tire Wheel Company's product was put on the market.*"

CHARLES F. HUDSON, Rec. p. 283:

Ans. to Q. 5. "My first experience with the solid tire was with the International Vehicle Tire & Rubber Company, of New York City, with a solid tire that fastened through the felloe. We made an application

of this tire for about two years and *discontinued it then on account of the fastening not being successful. We changed from this tire to the two wire internal fastenings.*"

Rec. p. 286:

"X-Q. 29. There was testimony in the Kokomo case about this tire and the following statements were made by a witness by the name of Jacobs: 'What was your experience with the *Peoria clincher tire?* A. *It gave very poor satisfaction.* Q. What was the trouble with it? A. The rubber split where the tire clinched it and rolled off'. Does this conform with your recollection as to your experience with the Peoria clincher tire?

A. It certainly does."

Rec. p. 288:

"X-Q. 43. You spoke of this International fastening not being successful. Do you remember what the chief objections were?

A. They could not apply the rubber tight enough with a band and *the fastening was entirely unsatisfactory.*"

FRED M. MECKEL, Rec. p. 363:

"X-Q. 28. Did you ever use any Morgan & Wright band tires?

A. Yes, sir.

X-Q. 29. They have gone out of use entirely, have they not, as far as you know?

A. I have not used any for a great many years. *As far as I know, they have gone out of use.*"

JACOB E. HANSON, Rec. p. 422:

"X-Q. 41. Was this English tire that you bought of Kimball what was known as the clincher tire?

A. Yes.

X-Q. 42. Those clincher tires didn't stay long on the market in this locality, did they?

A. No.

X-Q. 43. *The internal two-wire tire drove them out, did they not?*

A. *Yes, sir; they did.*"

JAMES W. PITNEY, Rec. p. 485:

"X-Q. 21. Was it what was known as the English or clincher tire which was held on by clinching the sides of the flanges in against the rubber?

A. Yes, sir.

X-Q. 22. This old form of tire has been supplanted by this new form of tire (the Grant) has it not?

A. Yes, sir."

FRANK P. STONE, Rec. p. 523:

"X-Q. 51. Were you acquainted with the rubber tires (I refer to the forms of solid rubber tires) that were in use in the City of Chicago prior to the introduction of complainant's tire?

A. For some years prior to my knowledge of complainant's tire, I had made considerable inquiry into the merits of other rubber tires, used in this city and New York, as well as in England and on the Continent. We had received a number of letters from French manufacturers of tires in Paris, urging us to adopt their tire, showing illustrations of numerous methods of securing the rubber to the wheel. I made it my special endeavor on one of my trips to New York to look into the merits of the various tires then in use and the result of my investigation was that rubber tires were so expensive that they did not warrant their adoption for general use. And I may state further, I

was informed by some of the leading builders that they did not possess sufficient durability to warrant the outlay. This opinion was given me by those who had had considerable experience with them in service. I refer to carriage builders."

WILLIAM S. ADAMS, Rec. p. 541:

"X-Q. 33. Do you ever see that English tire in use today?

A. I haven't noticed it lately within the last two or three years."

CHARLES F. KIMBALL, Rec. p. 546:

Ans. to X-Q. 22. "DuBois has at different times had several patents of tires, the particular one which we made a trial of consisted of two plates of steel with rubber between them, the rubber being compressed and the outer plate of steel coming in contact with the ground."

Ans. to X-Q. 24. "We did not have so much trouble with the rubber in the English tire pulling out of the channel as we had from the constant cutting of the rubber, owing to the fact that this English rubber was elongated when pressed into the channel in place of being offset as on most of the tires now in use, and also from the fact that the rubber was vulcanized to such an extent that it wore away very quickly."

Thus all the witnesses are agreed that all attempts to avoid the Grant patent by change of shape of the flange or rubber, by change of location of the wires and by the substitution of a metal band or any other form of fastening for the two wires located exactly as in the Grant patent have met with failure, and tires embodying these changes from the Grant tire have all disappeared from the market, leaving the Grant tire absolutely supreme. The only tires which

have remained in actual commercial use, as exhibited in the "Subsequent Art" in "Complainant's Diagram of Tires", are Chinese copies of the Grant patent.

THE REQUIREMENTS OF A SOLID RUBBER TIRE.

Why is it that the public, the carriage makers, the carriage repairers and the tire manufacturers have universally and practically exclusively used the Grant tire on certain classes of vehicles? What is there in the tire that makes it the only tire for these purposes to the exclusion of all other tires?

We confidently submit that the reason is because the Grant tire is a new and patentable combination of parts coacting together in the manner of a true combination to produce a new and useful result. It is not simply an aggregation of old elements or parts collected together, each performing its own function in its old way, but this record shows that the parts of the tire enter into combination, each coacting with the other parts and that the combination performs new and useful functions.

It would seem a simple matter to fasten a strip of rubber to the periphery of a wheel and make a solid rubber tire. Upon reflection, it is obvious that such is not the case; moreover the absolute lack of any evidence of any practical use of the rubber tires of some eighty prior patents which have been brought before the courts proves that this is not the fact. (116 Fed. 365.)

A rubber tire must be strong and durable. No tire but the Grant tire is strong enough or durable enough to be of commercial utility.

The requirements of a rubber tire are many.

It must be set into a channel on the periphery of the wheel rim, and the relation of the tire to the channel must be such that the tire when compressed and bent sidewise

shall not escape from the channel and also shall not be cut on the flange of the channel.

Some kind of fastenings are necessary, because the tire, unless provided with fastenings, would be easily thrown out of the channel and off the wheel. The fastenings must be strong enough to hold it in the channel.

The fastenings must be so arranged as not to cut the tire. The tire, therefore, should be thick and substantial at the points where the fastenings are placed.

As a tire rolls along over the ground, it is compressed at a point in advance of its contact with the ground, and this compression causes the tire to "creep" or move slowly around the edge of the rim. Provision must be made for this "creeping".

Defendant's expert witness Pond states (Rec. p. 216):

> "It is a well known fact that in tires of the Grant construction the tires creep more or less around the rim, and the wires creep more or less through the tires."

Lastly and by no means least, the tire must stand those shocks and blows delivered against its side as the wheel is driven rapidly against the car tracks, curbings and other inequalities in the road. The efforts of inventors prior to Grant were directed towards obtaining a fastening, usually in the form of cement, which would hold the tire rigidly and solidly in its channel. Grant showed this to be wrong, and in his tire he adopted a radically new and different plan.

Grant constructed his tire so that it was mobile in its channel, could creep if necessary and would yield laterally, and thus the lateral blows against it would be cushioned. Every one knows how a device which yields to repeated blows is more durable and withstands better those blows than one which is rigid and which, therefore, receives the

full force of the blows. This principle is inherent in Grant's tire and is one of the reasons for its success.

Grant's construction is also such that the tire after having been tipped from its seat in the channel by a side blow automatically restores itself to normal position when the side pressure is released.

This record shows that the Grant tire was the first tire and the only tire to satisfy every requirement of a strong and durable tire. The shape of the rubber in combination with the shape of the channel is such that the rubber when compressed by a heavy load does not bulge out over the periphery of the flanges and be cut thereby. This advantage is secured by the breadth of the tire between the flanges, the placing of the angle between the exposed and unexposed portion below the periphery of the flanges, and making the exposed portion at an obtuse angle to the unexposed portion.

By locating the two wires entirely within the unexposed portion, advantage is taken of the great width of the tire and the mass of the rubber at that point so as to provide greater strength of rubber on which the wires bear.

By the use of *two* wires well separated from one another and still surrounded by sufficient rubber, the danger of cutting the rubber by the fastenings is reduced to a minimum.

By having two wires the rubber tire is held at two points, thereby distributing the strain and obtaining greater security than if the tire were held at only one point.

By the use of the two wires in combination with the shape of the tire itself, there was for the first time obtained a tire which was durable, because it was mobile and would *yield* laterally to the lateral blows and strains received when the wheel and tire were driven against car tracks, curbings and inequalities in the road. Because of the shape of the outer portion of the tire, in combination with the shape of the inner portion and the shape of the flanges, the tire when

under compression and when struck with a side blow does not simply squash down over the opposite flange and get a bearing thereon, but it bears in the lower corner between the opposite flange and the bottom of the channel and tends to lift the side of the tire on which the blow is struck. Between each wire and the bottom of the channel is an annular cushion of rubber, and this cushion, no matter how tightly the wires have been stretched in the application of the tire, possesses some elasticity. The side blow lifts that side of the tire, and with it the wire on that side, because this annular cushion beneath the wire is composed of rubber and allows the wire to lift. Because, therefore, of its construction, the Grant tire is able to yield sufficiently, although slightly, so as to cushion the side blows, and the life of the tire is thus prolonged. This is a very valuable feature of the Grant tire, and this function alone is new and inherent in the tire, as found as a fact in this case by the Circuit Court of Appeals for the Second Circuit.

It must be borne in mind that the Grant tire is *not* cemented into the channel. This is an essential and important point. Any tire that is cemented in its channel is rigid and cannot "creep" or yield to lateral blows. It is, therefore, easily and quickly destroyed. The absence of cement in the Grant tire is a vital characteristic. As we shall see when we come to examine the prior art, Grant, by omitting the cement and by permitting the tire to tip, to creep and to move in its channel, obtained a radically new and useful result.

The two wires in the Grant tire being tightly drawn prevent the side blows or twists from pulling the tire entirely out of the channel, although permitting the slight tipping just referred to.

The shape of the channel with its flaring flanges and the shape of the tire fitting thereto causes the tire, after having been tipped by a lateral blow, to reseat itself in the channel

in its normal position. A tire which permitted tipping but did not provide by the correlation of the parts for re-seating would be a useless structure.

By the use of the annular wires entirely enclosed within the holes in the rubber tire and not secured in any way to the channel, opportunity is provided for the rubber tire to "creep" around the wheel, and there is no danger of the tire being torn and the wires broken because of this tendency of the tire to "creep".

The re-enforcing strip of canvas at the bottom of the tire and extending partially up on the sides of the unexposed portion adds strength and durability to the tire.

To these features and to their combination in one structural unit, the Grant tire owes its unparalleled supremacy in its field.

THE PRIOR ART.

It is not contended by anyone that there is any patent in the prior art which is an anticipation of the Grant tire. The defendant's experts and counsel and the Court of Appeals for the Sixth Circuit have all recognized and admitted that the combination of elements found in the Grant tire is a new combination; but the proposition has been advanced that the patent is invalid, because each of its elements individually may, in a sense, be found in the prior art.

We respectfully submit that a study of the prior art only serves to emphasize the merit of the Grant patent and to show wherein its elements form a real and novel combination having marked patentable quality, and that it was because of the lack of this combination that the prior devices failed. Grant did far more than merely collect together a channel from one patent, a tire from another patent and a fastening device from a third patent, and put them all together so that each would perform its own function in its old way.

We ask the court to look at the "Prior Art" exhibited in "Complainant's Diagram of Rubber Tires", as it contains, in convenient form, illustrations of all those devices which are supposed to be pertinent as references to the Grant patent.

The following patents may be dismissed without any discussion at all, as they show no one of the three essential features of the Grant patent, namely, the channel with flaring sides; the rubber tire set into that channel and having an exposed portion at an angle to the unexposed portion; and fastening devices composed of one or more wires. (We give herewith the numbers of the prior patents marked on "Complainant's Diagram of Rubber Tires, Prior Art".)

No. 1,	Dale British	patent No.	12,580.
2,	Woodward	"	443,735.
3,	Myers	"	468,971.
10,	Kearsley	"	4,352 of 1883.
11,	De Spare	"	540,478.
16,	Schrader	"	466,577.
24,	Brown & Stillman	"	488,494.

The following patents may be considered together, as they show merely a rubber tire cemented into a channel:

No. 4,	Everett Swiss	patent	No. 8,120.
5,	Kelley	"	321,819.
6,	Owen	"	365,091.
7,	Kelley	"	362,514.
8,	Lenton	"	14,812 of 1890.
9,	Coops	"	20,678.

None of these patents shows any form of fastening except cement for holding the tire in the channel.

The Owen patent (No. 6) having been referred to by the Circuit Court of Appeals for the Sixth Circuit may be taken as the best example of this class. It is a velocipede tire having an outside portion of hard rubber and an inner por-

tion of soft rubber. Its cross-sectional shape resembles superficially the cross section of the Grant tire, but it differs essentially therefrom in having the angle between the exposed portion and the inner portion on a line between the peripheries of the flanges of the tire. There are no wires or fastenings of any kind to hold the tire in its channel, but it is supposed to be held in place, as are the other tires of this class, by cement only. As long as the cement holds, the tire is prevented from creeping and from yielding to side blows, and because of this rigidity the tire would be quickly torn from its cement and thrown out of the channel.

The defendants and the public in general are at liberty to use this Owen tire cemented into its channel, but they have not done so for the simple reason that it is impractical.

The Owen tire is a good example of the efforts of prior patentees to solve the problem of a successful rubber tire by making the tire solid and immovable in its channel.

The Grant tire differs from the Owen tire in having the angle between the internal and external portion of the rubber below the peripheries of the flanges of the channel and in having two wires for holding the tire in its channel, yet allowing it to creep if necessary and to tip and yield to lateral blows, so that the tire is securely and durably, though yieldingly, held in its channel.

The remaining tires of the prior art are provided with some form of wire or band re-enforcements or fastenings, and will, therefore, be discussed one by one.

The defendant's expert in this case lays the most stress on the two British patents to Willoughby, No. 12 and No. 25 on complainant's diagram.

No. 12, Willoughby patent No. 5924 of 1892, contains many figures, but most reliance is placed upon Fig. 8-*a*. This figure shows a channel with *converging* flanges, a rubber tire shaped with downwardly spreading sides to fit within those converging flanges, and two coiled wires inserted

through holes in the rubber tire. This is merely an example of another effort to hold the tire solidly in place in its channel. The converging flanges would have that effect so long as the side blow was not too severe. If it was severe enough to tip the tire, it would lift it from its channel and the tire would never restore itself to its seat because the bottom of the tire is its widest part. Moreover, the wires being merely spring wires, can have but very little effect in holding the tire in place. They would allow the tire too great movement and would be absolutely inefficient. They are obviously used simply to strengthen the tire longitudinally and to limit its longitudinal elasticity. The spring wires stretch and contract as does the rubber, but more positively and definitely. They are not holding devices in any sense.

Why does not the defendant use this tire?

No. 25. Willoughby patent No. 18,030 of 1892, shows a steel tire laid on top of a rubber bed in a channel on the wheel. Two wires are provided, but they pass through holes in the steel tire and not in the rubber bed, and they are above the flanges of the channel.

It is perfectly clear from these two patents that Willoughby never had any other idea than to hold his tire solidly in place in its channel. There can be found no conception, even if the two Willoughby patents be combined, of a tire like Grant's having a channel with outwardly flaring flanges held in place by two springless wires located in the inner or unexposed portion of the tire and at its broadest point, thereby obtaining the greatest possible mass of rubber as a bearing for the wires and permitting the tire to tip and yield so as to cushion the side blows received by it. Certainly this vital part of Grant's combination is entirely lacking in the Willoughby patents.

The Willoughby patents were before Judge Thomas in the original case on the Grant patent in 1898 and were before the Court of Appeals for the Second Circuit in the

Firestone case; but no special attention was paid to them, as in those cases they were not regarded as particularly pertinent references to the Grant patent and the attorneys for the defence in the Firestone case were the same as are for the defence in this case. The Willoughby patents have not changed since they were presented to the consideration of Judge Thomas, and the only real reason why they are now urged by the defendant's experts is that the Court of Appeals for the Second Circuit has so effectually disposed of the Latta patent as a reference as to throw the defence back on to the much less suggestive Willoughby patents.

No. 14, the Latta patent No. 341,811, was relied on most strongly by the defendants in the Firestone case, but the Court of Appeals in that case so effectually disposed of it that very little has been heard of it since. It shows a tire having serpentine spring wires imbedded in the rubber portion. The wires like those of Willoughby patent No. 5924 are merely re-enforcing devices and have little or no effect in holding the tire in place. The Latta patent at page 2, line 85, advocates the use of cement for holding the tire solidly in place. The shape of the base is such that, if the tire were tilted, it could not reseat itself.

Let the defendants use the serpentine spring wires imbedded in the rubber tire of the Latta patent, and let them use cement to fasten the tire in the channel. They would thus avoid the Grant patent. They have not used the Latta tire because it would not work in that it does not contain the combination which has made the Grant tire a success.

The Circuit Court of Appeals for the Second Circuit thus disposes of the Latta patent (Firestone Case, 151 Fed. 237):

> "The patent to Latta, No. 341,811, granted May 11, 1886, is now advanced as the nearest approach to anticipation found in the old art. It is a somewhat significant fact that the Latta patent is not mentioned in the opinion of the court in either the Goodyear or

Columbia case, but, irrespective of any presumption which may be drawn from its belated prominence, we are of the opinion that its disclosures are in no way fatal to the claims in controversy. Our reasons may be epitomized as follows:

"First. The patent is for an improvement in velocipedes, or bicycles, where the wheels, guided by the rider, follow each other in a narrow track. The danger from lateral strain in such a vehicle is comparatively remote.

"Second. The description says that 'It is obvious that the tire may be secured in its seat by cement, in the usual manner, if desired'. If this were done the distinguishing feature of the Grant tire would, in any view, be eliminated.

"Third. The wires are molded into the tire, thus preventing all independent action between the wires and the rubber. If subjected to lateral strain the rubber will not turn on the wires, and if subjected to longitudinal strain it will not 'creep' along them. The Latta tire in this particular is little more than a rubber tire reinforced and strengthened by wires.

"Fourth. The wires are wavy or serpentine in form, 'which prevents them from drawing in the tire if broken therein'. Every precaution seems to have been taken to prevent any independent movement of the wires. It is also obvious that with the use of these sinuous, wavy wires there must be many points where the wires are not within the inner or unexposed portion of the tire, namely, below the line between the two angles of the tire, as pointed out by Grant. When subjected to lateral strain at these points it would seem that the tire can no longer exert the necessary leverage to lift the side of the tire from the channel. In other words, the strain will operate to crowd the tire against the

opposite flange with no tipping action to relieve the pressure.

"Fifth. Latta's tire is circular in cross-section, there being no angles as shown at c' of the Grant drawings. The widest part of the Latta tire is above the outer peripheries of the flanges and receives no protection therefrom.

"Sixth. The bottom of Latta's tire is concaved to fit a corresponding convexity in the bottom of the channel, and it is argued with some plausibility that such construction would, in case of lateral strain, severe enough to cause either side to rise, result in jamming the rubber so that it could not readily reseat itself.

"Other reasons might be given, but we think enough has been said to show that in our judgment Latta had no conception of the improvements found in the Grant structure."

No. 15, the Welch British patent No. 14,563 of 1890, and No. 21, the Timberlake British patent No. 20,706 of 1890, show specifically the same construction. The flanges of the channel are practically done away with and shallow grooves provided into which the rubber tire sets. The tires are re-enforced by wires through the portions setting into the grooves. In the Welch patent, page 5, line 39, the use of cement is advocated for securing the tire to the channel. Cement certainly would be necessary, because the wires are so arranged as to have almost no efficiency in holding the tire on the rim. The least side blow would knock the tire off the rim. These patents are entirely foreign to Grant's invention.

No. 17 and No. 18, the Elliott patents 440,701 and 440,702, show rubber tires set into a channel having substantially vertical sides. In patent No. 440,701 attempt is made to hold the tire in the channel by pins or rivets passing through the rubber and the rim. In patent No. 440,702

a circular band passes through a hole in the tire, and its ends are fastened by carrying them through the tire and through the rim of the wheel.

The Elliott patents show simply another effort on the part of the prior inventors to hold the tire rigidly in the channel. In both of the patents the flanges of the channel are straight, and the fastening devices are intended to be solid and unyielding, and therefore there could be no tipping or yielding of the tire as in the Grant structure to soften the blows received in actual use.

No. 19, Grant and Jeffrey's patent No. 470,483; No. 20, Green patent No. 169,100; No. 22, Fig. 6 of Rogers patent No. 539,826, and No. 26, original Rogers tire, all having a single wire or a group of wires through a hole in the middle of the tire, are entirely different from the Grant patent. Owing to the shape of the channel in every one of these devices, it would be impossible for the tire to tip or yield on account of a side blow. The fastening being central also holds the tire against any such yielding action. These patents lack all the characteristics of the Grant tire. The flanges of the channel are not flaring. There is no angle between the inner or unexposed portion of the tire and the outer or exposed portion of the tire lying within the periphery of the flanges, and there are not two wires firmly but yieldingly holding the tire in place in its channel. The shape of the tire and the shape of the channel are not such that the tire could reseat itself automatically if it had once been tipped out of place.

No. 22, Figs. 7 and 8 of the Rogers patent No. 539,826, shows tires with vertical sides intended to be cemented in a channel having vertical flanges. (See page 1, line 75 of the Rogers patent.) In Fig. 7 two wires are shown, and in Fig. 8 a band is shown, both forms of fastening being located above the flanges and at points in the tire where it is narrowest and therefore weakest. These Rogers fasten-

ings are detrimental rather than helpful to the Rogers form of tire, because they weaken it at critical points, and because they serve, on account of the square shape of the tire and channel, to hold it solidly in place in the channel. The Rogers patent lacks all the features which make the Grant combination a success. Why does not the defendant use the Rogers tire rather than submit to the expense of defending this suit?

No. 23, the Claypool patent No. 432,223, has a channel with inwardly converging flanges in Fig. 5 and with perpendicular flanges in Fig. 8. In Fig. 5 two wires are imbedded in one slit in the channel. This patent is not pretended to, and does not, contain any feature of Grant's invention and is absolutely immaterial.

This review of the prior art makes it perfectly clear that the entire effort of all those who preceded Grant was to obtain a tire which would be solid and unyielding in its channel. The prior patentees endeavored to secure this result by every means possible. In almost all cases they advocated the use of cement. In some cases they sunk their tire deep into the channel and made the sides of the tire and sides of the channel perpendicular so as to obtain perfect solidity. In other cases with the same object in view, as, for instance, in the Willoughby patent No. 5924, the flanges of the channel were made to converge inwardly in order to clinch upon the tire.

In not one of these patents is there described a structure which could by any possibility have the mode of operation and the consequent success of the Grant tire.

As we have seen, each one of these patents lacks some of the essential features of the Grant patent. Each one was a failure and the Grant tire has been a wonderful success.

Is not that fact sufficient to show that the differences that exist between the successful Grant tire and the useless tires of the prior art are material and vital differences?

Inasmuch as it is fully proved in the record before this court that the date of Grant's invention is early in the spring of 1894, it is unnecessary to consider the Blosser and Kunkle patent No. 529,474. Prior to the date of Blosser and Kunkle's application, July 23, 1894, Grant had made a full-sized rubber tire like that shown and described in the patent in suit and had it in use in the spring of 1894. The B. F. Goodrich Company, of Akron, Ohio, furnished the rubber in April, 1894. (See the B. F. Works' deposition, page 4 of the "Extract from Defendant's Exhibit Appeal Record Goodyear Case":* original letter reproduced, and the original drawing of the Grant tire furnished the Rubber Company, opposite page 2.) Both E. S. Kelley and A. W. Grant confirm Works' testimony. (See same page 12, Qs. 14–16, and page 26, Qs. 3–5.) Grant further testified that he disclosed his invention to Blosser and Kunkle early in 1894. (See same Q. 5, page 26.) This matter need be considered no further, as defendant, we understand, does not contend that Blosser and Kunkle's invention antedates Grant's invention.

We doubt if any case has ever come before the court disclosing more persistent efforts for many, many years, prior to the patent, to solve the problem first solved by the patent. These efforts were not confined to this country. All over the civilized world the desirability of a suitable tire for vehicles was recognized and every effort made to secure it. The need in this country was so clearly recognized that, as the record shows, American manufacturers sent representatives to foreign countries, prior to 1894, to investigate as to rubber tires. All these efforts were practically fruitless as far as any useful result was concerned, until Grant made his invention. We have in this record that one of the prominent carriage manufacturers in the West, Charles F. Kimball, of

* This contains certain portions of the record in the Goodyear case which are not printed in the main record in the present case, but are evidence herein, under the stipulation (Rec. p. 99).

Chicago (Rec. 545), went abroad and brought back all the information he could get — what did that amount to? Absolutely nothing. One of the prior patentees, Howard DuBois, of Philadelphia, and also representative of several other large concerns, went abroad for the same search and nothing but failure resulted. Forms of fastening means such as the Elliott and DuBois tapes or bands had been suggested, and they represented the best fastening appliances so far as strong, rigid fastening appliances were concerned, but Grant's combination employed an entirely different form of fastening in its association with the other elements of the combination — one far less strong in and of itself but capable of co-operation with the other elements. In that lay its strength.

The development of the business, due to the popularity of the Grant tire, was marvellous. Originally introduced at Springfield, Ohio, in 1894, by Kelly and Grant, its supremacy grew until in November, 1905, in the cities of Chicago and New York, no other form was being sold for heavy carriages. (Rec. 247, Rec. 851–853.) By 1908 one branch manager alone had applied 50,000 Grant tires. (Rec. 57.)

GRANT'S TIRE IS NOT AN AGGREGATION.

The defendant attacks the validity of the Grant patent on the lines of the decision of the Circuit Court of Appeals for the Sixth Circuit in the Goodyear case, 116 Fed. 363, alleging, first, that the Grant tire is not a true combination but is an aggregation of old devices; and, second, that if it is a combination it does not show invention over the prior art.

We will consider these arguments in their order. The opinion of the court in the Goodyear case cites against the Grant patent the cases in this court of — .

Hailes v. *Van Wormer*, 20 Wall. 353;

Reckendorfer v. *Faber*, 92 U. S. 347;
Pickering v. *McCullough*, 104 U. S. 310.

These three Supreme Court cases establish clearly the difference between a combination and an aggregation, namely, that an aggregation merely brings together in juxtaposition old devices, neither reacting on the other with a new result or new mode of operation, but each retaining its old mode of operation and each producing its old effect; whereas a combination of old devices is the association together of those devices in a united whole, wherein each device co-operates with the others to produce a unitary new and useful result.

In *Hailes* v. *Van Wormer*, the patentee had brought together into one stove various different devices, such as a fire pot, a coal reservoir, invertible flues, dampers and openings in the casing, each of which was old, and in the patented stove was placed merely in juxtaposition to the other elements, and did not co-act therewith. The patent, therefore, was held invalid as an aggregation.

In *Reckendorfer* v. *Faber*, a patent for a lead pencil having a rubber tip was held invalid as merely aggregating on one holder the lead for writing and the rubber for erasing. This case gives several illustrations of the difference between an aggregation and a combination, laying down the law as follows (p. 357):

> "The combination, to be patentable, must produce a different force or effect, or result in the combined forces or processes, from that given by their separate parts. There must be a new result produced by their union: if not so, it is only an aggregation of separate elements. An instance and an illustration are found in the discovery, that, by the use of sulphur mixed with india-rubber, the rubber could be vulcanized, and that without this agent the rubber could not be vul-

canized. The combination of the two produced a result or an article entirely different from that before in use. Another illustration may be found in the frame in a saw-mill which advances the log regularly to meet the saw, and the saw which saws the log; the two co-operate and are simultaneous in their joint action of sawing through the whole log: or in in the sewing-machine, where one part advances the cloth, and another part forms the stitches, the action being simultaneous in carrying on a continuous sewing. A stem-winding watch-key is another instance. The office of the stem is to hold the watch, or hang the chain to the watch: the office of the key is to wind it. When the stem is made the key, the joint duty of holding the chain and winding the watch is performed by the same instrument. A double effect is produced or a double duty performed by the combined result. In these and numerous like cases the parts co-operate in producing the final effect, sometimes simultaneously, sometimes successively. The result comes from the combined effect of the several parts, not simply from the separate action of each, and is, therefore, patentable."

In *Pickering* v. *McCullough* this Court held that it required no invention to use a mold for shaping the exterior of a crucible, the inside of which was shaped by a well-known device, when it was old to use such a mold to shape the exterior of the crucible when its interior was being shaped by hand.

It is very plain from these decisions that the Grant tire is not an aggregation. Each part co-acts with the other part to produce a united whole having a combined effect. The channel with its flaring flanges supports and partially embraces the rubber tire. It is so shaped that the tire cannot be cut against the edges of the flange. The two wires

co-act with the rubber tire, bearing against the rubber at its thickest portion and below the peripheries of the channel. The two wires press and hold the rubber tire in the seat formed by the channel and its flanges, and each acts independently of the other to form a separate fastening; yet each wire co-acts with the other wire to enable the tire to yield to the side blows received in actual use, one wire rising as the tire is tipped and the other tire forming, as it were, the fulcrum for this tipping action. The shape of the tire is such that this tipping action is permitted and such that, when the side force is removed, the tire may reseat itself in its original position. The two wires being continuous permit the tire to move and creep relatively to the wires so that no strain is brought upon the wires from the natural tendency of the tire to creep. There is, in fact, most perfect co-action between the elements of the Grant tire.

A good illustration of a similar combination is found in the ordinary electric incandescent lamp, where the base, the glass bulb, and the incandescent filament form a true combination, each part acting upon the other in the same way as do the parts of the Grant tire act upon one another.

The defence that the Grant tire is an aggregation of old devices must absolutely fail.

THE GRANT TIRE IS A PATENTABLE COMBINATION.

There can, therefore, be no doubt that the Grant tire is a combination and it is clearly also a patentable combination. Even if it be assumed that the individual elements of the Grant tire can be found in the prior art in separate patents, there is no patent in which these elements are combined in the single unitary tire. This fact is undisputed.

The mechanic skilled in the art and having knowledge of these prior devices would have sought in vain for the idea of the combination which produced for the first time a suc-

cessful rubber tire. There was no foreshadowing or hint of that idea in the prior art. It required the genius of the inventor to develop it. Even if the prior art had taught the skilled mechanic to use some of the elements of the Grant tire separately, it did not teach him to combine them as Grant combined them; but, on the contrary, although the prior art taught the skilled mechanic many kinds of combinations, they were all different combinations from that of Grant. The very multiplicity of the tires of the prior art, all practical failures, emphasizes that more than mere mechanical skill was required to so combine and organize the elements of the tire as to make it what the world had been trying to get for many years.

Our discussion of the prior art (*supra*, pp. 26–36) has shown that rubber tires were old, that channels for holding them were old, and that fastening devices of various kinds — some of them consisting of one or more wires or tapes — were old, but the art entirely fails to show, as every one admits, the combination of channel, tire and wires first made by Grant.

The Court of Appeals for the Sixth Circuit admitted this.

> "It may be conceded that no rubber tired wheel in the old art has been shown which includes each of the identical parts which unite to make Grant's tire."

(Goodyear case, 116 Fed. 369).

The prior art taught that it was essential to hold the rubber in the channel rigidly and immovably, and for this purpose substantially all of the prior patents advocate and direct the use of cement for holding the rubber tire in place. This is true among others of the Owen patent and the Latta patent, which have been strongly relied on as most nearly approaching Grant's invention. The use of cement proves absolutely that these early inventors had no thought whatever of Grant's tire. They had no conception of

Grant's underlying theory or of his method of operation. They were all struggling to hold the tire so solidly to the rim that it could not budge. This effort, as we have seen, necessarily resulted in failure, because such tires do not cushion the side blows and, therefore, quickly break from their fastenings, no matter how solidly made, and are torn from the rim.

Many of the patents of the former art resort to *inwardly* converging flanges on the channel in order to hold the tire in place. A good example of this is the Willoughby patent No. 5924, regarded in this case by the defendant's expert as being the closest reference to the Grant patent, although in previous litigations this patent has not been considered sufficiently pertinent to be called specifically to the attention of the courts. This again is an effort in the wrong direction.

In the Willoughby patent No. 18,030 the external face of the tire is made of steel and through it run two fastening wires. This steel rim would not yield, but is intended to hold the rubber solidly in place in the channel. The patent is not for a rubber tire at all, but for a steel tire with a rubber seat. It is absolutely immaterial.

In those prior patents which do show wires, the two considered most pertinent by the defendant showed merely spring wires. In the Willoughby patent No. 5924 the wires are made with spring sections and in the Latta patent the wires are molded in serpentine form into the rubber tire. The wires are not relied upon to hold the tire in place, but merely to reinforce the rubber. In the Willoughby patent the flanges are sloped inwardly, in order to clinch the tire, and in the Latta patent cement is used.

In the Welsh British patent and in the Timberlake British patent there are no substantial flanges to hold the tire in place, and reliance must be laid on cement. There is no

combination in these patents between channel, tire and wires, as is found in the Grant tire.

In fact, the teaching of the prior art was entirely away from the combination found in the Grant patent. Grant made an obtuse angle between the inner portion of his tire that fits the channel and the outer or exposed portion, and placed that angle below the peripheries of the flanges of the channel. By reason of the construction there is no danger of cutting the tire on the edges of the channel. No such arrangement is found in the prior art. In the Owen patent, which is perhaps the closest to this construction, the angle between the inner and outer portions of the tire is at the periphery of the flanges. In other patents effort is made to prevent the cutting of the tire on the flanges by rounding the flanges, as in the Elliott patents, Nos. 17 and 18. None of the prior patents teach the art that it is necessary that the angle between the inner and outer portions should be *below* the periphery of the flanges.

Those patents of the prior art showing more than one wire place these wires in the tire at an entirely different place from the place where Grant places his wires. In Grant's tire the wires are located below the peripheries of the flanges and in the thickest portion of the tire, so as to provide a substantial amount of rubber as a bearing for the wires. In the Willoughby patent No. 5924 the spring wires are placed close to the edges of the tire. In the Latta patent three wires are used, thereby cutting the tire too much, and the outside wires are placed close to the edges of the rubber tire. In the Rogers patent, No. 22, the fastenings, consisting of one wire, of two wires, or of a band, are placed at the narrowest point of the tire so as to weaken it where it should be strongest. Thus the prior art, even in this matter of the location of the wires, fails to suggest Grant's construction.

Thus we submit that the prior art, down to almost the

smallest detail, taught the skilled tire-maker absolutely nothing as to the organization and relations on which the Grant tire has built its success and practically nothing as to any of Grant's individual features. Any accidental resemblance between a detail of the prior art and the corresponding detail in the Grant patent is not in the slightest degree significant, for that particular detail in Grant gets its value only from its relation to other parts and its functions as an element in Grant's new organization. The prior art said: "Make your tire solid in its channel either by cement or by clinching the flanges of the tire. Do not allow the tire to have the least movement. That would be fatal". The prior art said: "If you use wires, place them anywhere, generally above the flanges of the tire, and make these wires springlike or serpentine. Do not allow the tire to 'creep'". All these teachings would have led a man skilled in the art directly away from the Grant tire.

It is admitted that the Grant tire is different in structure and in the arrangement of its elements from the tires of the prior art; but it is argued that these differences are immaterial, yet it is also conceded that the Grant tire is a practical success, while all the devices of the prior art were failures. The only logical conclusion that can be drawn is that the differences between the Grant tire and the tires of the prior art are not immaterial, but are just those differences which caused it to become a commercial success.

Where an inventor has struck out on lines that are, as in this case, new, and has succeeded where others have failed, invention, we submit, must necessarily be present. Grant did not merely select one feature from one patent and another feature from another patent, but with great intelligence and inventive skill he combined various elements, some of them found in the prior art, into a new and useful structure having a new and useful combination and mode of operation. Even if all the elements are individually old,

such a combination has often been recognized as of the greatest importance in the development of the useful arts and well worthy of protection by Letters Patent.

The law was expressed by this Court in *Loom Company* v. *Higgins*, 105 U. S. 580, in which case the Court held valid a patent for a loom, the elements of which were all old, against the argument that it required no invention to produce the combination. The Court said (p. 591):

> "At this point we are constrained to say that we cannot yield our assent to the argument, that the combination of the different parts or elements for attaining the object in view was so obvious as to merit no title to invention. Now that it has succeeded, it may seem very plain to any one that he could have done it as well. This is often the case with inventions of the greatest merit. It may be laid down as a general rule, though perhaps not an invariable one, that if a new combination and arrangement of known elements produce a new and beneficial result, never attained before, it is evidence of invention. It was certainly a new and useful result to to make a loom produce fifty yards a day when it never before had produced more than forty; and we think that the combination of elements by which this was effected, even if those elements were separately known before, was invention sufficient to form the basis of a patent."

See also:

Potts v. *Creager*, 155 U. S. 597, 608.

Carnegie Steel Co. v. *Cambria Iron Co.*, 185 U. S. 403, 446.

Krementz v. *Cottle Co.*, 148 U. S. 556, 559.

In Cantrell v. *Wallick*, 117 U. S. 689, the Court said (p. 694):

> "The first defense is based on the theory that a patent cannot be valid unless it is new in all its elements, as well as in the combination, if it is for a combination. But this theory cannot be maintained. If it were sound, no patent for an improvement on a known contrivance, or process, could be valid. And yet the great majority of patents are for improvements in old and well-known devices, or on patented inventions. Changes in construction of an old machine, which increase its usefulness, are patentable. *Seymour* v. *Osborne*, 11 Wall. 516. So a new combination of known devices, whereby the effectiveness of a machine is increased, may be the subject of a patent."

In *Expanded Metal Co.* v. *Bradford*, 214 U. S. 366, the Court said (p. 381):

> "It is perfectly well settled that a new combination of elements, old in themselves, but which produce a new and useful result, entitles the inventor to the protection of a patent."

We respectfully submit that in this case it was certainly a new and useful result to make a successful solid rubber tire to complete the elimination of all other such tires from the market.

QUALITIES INHERENT IN THE GRANT TIRE.

In accordance with these authorities, the Grant patent has been sustained many times by the Circuit Courts and by the Courts of Appeal, which have held that the Grant tire possesses patentable novelty involving a new organization and a new mode of operation which was inherent in that organization. The Court of Appeals for the Sixth Circuit, in the Goodyear case, 116 Fed. 363, did not have before it the true facts when it held that the Grant patent was

invalid. This Court proceeded on the theory, new at the time of the hearing before it, that the important feature of the Grant patent, consisting in the capacity of the tire to move and tip in its channel, was not inherent in the structure of the tire. The Court was led to believe that this capacity depended on the kind of wires used and the looseness with which they were applied. The Court then drew the inference that if the fastening wires of the Grant patent were sufficiently high in carbon as not to stretch and were applied as tightly as possible, the Grant tire could not move or tip or creep in its channel, but would be held there solidly and rigidly as if it were cemented there like many of the tires in the prior art.

The Court pointed out that there was no evidence in the record before it showing that the Grant tire, if secured with hard wires applied as tightly as possible, had this capacity, saying (p. 374):

> "That this capacity for side tipping or lateral movement under violent lateral strain is an operative function inherent in the particular arrangement of the old parts constituting Grant's combination is dependent wholly upon expert opinion. Its actual presence from practical experience or observation is not shown."

The Circuit Court of Appeals for the Sixth Circuit thus rested its decision that the Grant patent was invalid for lack of invention fundamentally on the finding that on the evidence in that case it was not shown that the Grant tire had the capacity to tip, if wires were used sufficiently high in carbon as not to stretch, and if these wires were applied as tightly as possible to the limit of their breaking strength.*

We wish to call particular attention to the above quoted statement of the Court of Appeals in the Goodyear case, as

*We discuss the opinion of this Court fully *infra* p. 64.

it is a complete refutation of the defendant's argument that in that case the capacity of the Grant tire to tip and move in its channel was fully proved.

The record in this case entirely disposes of this contention. The Court of Appeals for the Second Circuit expressly found as a fact that on this record the Grant tire was inherently capable of tipping in its channel, although the high carbon wires were applied stretched nearly to their breaking point, and that court said that, if this fact had been proved in the Goodyear case before the Court of Appeals for the Sixth Circuit, a different decision would undoubtedly have been reached. (Firestone Case, 151 Fed. 239.)

The tire of the Diamond Rubber Company, the defendant in this case, is made with high carbon wires applied with as much tension as the wires will stand without breaking, and the defendant's expert Pond has contended that it "staggers his mechanical credulity" to suppose that the tire can tip without breaking the wires. In other words, the defendant would like to contend that its rubber tire is held solidly in place in the channel.

This contention is on its face meretricious. If the defendant had desired to hold its rubber tire solidly in its channel so that it could not tip, it could easily have accomplished this result by cementing the tire in the channel or by clinching the flanges. The fact that the defendant does not use cement or clinching flanges, but does use Grant's combination, in which the tire is entirely free to tip and move, shows that the defendant insists upon retaining the combination of the Grant construction, although its argument would deny its advantages.

Let the defendant use a cemented tire or a clincher tire and avoid the beneficial tipping and moving of the Grant tire, and avoid infringement and the expense of litigation.

The fact that the Grant tire has the capacity for tipping

and thereby cushioning the lateral blows received as the tire strikes car tracks, curbings and other inequalities in the road, is proved in three different ways, by any one of which alone the fact would be sufficiently established.

I.

The capacity for the tire of Grant's invention to tip was shown by the simple expedient of inserting a screw-driver underneath one side of the "Defendant's Exhibit a Standard Rubber Tire Wheel", an example of the Diamond infringing tire sold by the defendant, and prying it up. (Rec. p. 330.) This was done in the presence of defendant's expert (Rec. p. 472), whose mechanical credulity must, then and there, have been satisfied that the tire had the capacity to tip, if the force was applied so as to accomplish the result. As abundantly proved, this tipping capacity of the tire of the Grant patent is due to the fact that there is a cushion of rubber lying between the wires and the bottom of the channel, and, as the side of the tire rises, the wire presses into this rubber cushion around the entire circumference of the tire and thereby rises slightly at the point where the force is applied.

Defendant's patent expert Pond admitted (Rec. p. 469):

> "I have tested the exhibit wheel (the Diamond tire) referred to in the question by forcing the blade of a heavy screw-driver under the tire centrally of the cut-away portion of the flange and prying the tire up with it, and *I have found that the tire and the adjacent exposed portion of the wire can be raised by such an operation to a slight extent.*"

Defendant's practical tire expert, Charles H. Smith, testifying concerning defendant's Diamond tire, admitted (Rec. p. 341):

> Ans. to R-X. Q. 122. "*It shows slight ability to yield to the use of a screw-driver.*

"R-X. Q. 123. The application of the screw driver to 'Defendant's Exhibit a Standard Rubber Tired Wheel', in the same way, shows that the elasticity of the rubber under the wire and its ability to yield is even greater than on the Firestone Side Wire Tire, because of the greater thickness of rubber due to the absence of cross wires. Is that not true?

A. Possibly so."

Defendant's witness Gorman testified about this Standard Diamond tire (Rec. p. 390):

"X-Q. 26. Now I am going to insert this screw-driver under the tire and the wire and raise both from the wheel and I ask you whether you do not see that both the rubber and the wire are raised up under the action of the screwdriver?

A. Yes, I saw it.

X-Q. 27. Then these tires are not put on so tightly that it is impossible for the wire and rubber to yield, provided the right kind of strain is put on it; is that true?

A. *Yes, there is naturally some elasticity in rubber.*"

Defendant's witness Samuels stated (Rec. p. 434):

"X-Q. 54. Here is a tire which a Diamond rubber man testified was put on as tight as he could, and yet by simply putting a screw-driver under it, as I do here, and moving it you can raise the base of the rubber, and also move the wire; did you know that?

A. Yes, sir, I know that.

X-Q. 55. What permits this wire to move?

A. Where it sinks to the rubber as he puts the screw-driver under it.

X-Q. 56. That is, it's the elasticity of the rubber between the wire and the channel, is it not?

A. Yes, sir.

X-Q. 57. *So that it is not impossible for this wire or rubber to yield or raise away from channel, provided the proper force is applied to it in the proper manner; is that right?*

A. *Yes.*"

Defendant's witness Ludlam testified generally as to the Grant type of tire (Rec. p. 257):

"X-Q. 91. Then if force enough were applied at any point to raise the retaining wire, this underlying rubber would yield to some extent, would it not?

A. It will."

"X-Q. 108. In other words, the underlying mass of rubber is not of sufficient hardness so but that this wire will or may yield and raise somewhat if sufficient force is applied; is that correct?

A. Yes, it will raise a little."

Defendant's witness Meckel testified (Rec. p. 366):

"X-Q. 47. When I put the screw-driver under this exhibit referred to (the Standard Diamond Tire) and raise it, can you see the wire move?

A. I did.

X-Q. 48. Do you know what permitted that wire to move when it was forced up?

A. I think so.

X-Q. 49. What was it, do you think?

A. Why, the elasticity of the rubber. The drawing of the wire against the rubber with a pry from underneath would allow the wire to move at the point of the pry, I should say.

X-Q. 50. *In other words, it's the elasticity of the rubber which lies between the wire and the channel against which the wire is drawn at one side of the wheel when the wire is drawn away at the other side; is that right?*

A. *Yes.*"

In the face of this testimony of its own witnesses the defendant was obliged to admit that the tire of the Grant patent, both generally and in the specific form of the Standard Diamond tire sold by the defendant, could tip.

It was then said that the forces applied in practice are applied differently from the application of the force by the screw-driver and could not possibly tip the tire. The screw-driver tests showed, however, that the tire tipped without breaking the wires. Defendant's own practical witnesses testify that the side strains found in actual use are often sufficient to break the wires. Broderick, a carriage builder of fifteen years' experience, called by defendant, admitted (Rec. p. 235):

> "Of course, there is times when the wires will break."

Ludlam, who has a large general carriage and wagon shop in Glencove, Long Island, and does a business of $50,000 a year, makes the same admission. (Rec. p. 258.)

Defendant's witness Hudson, a tire salesman who has been familiar with the Grant type of tire since 1896, states that the side strains are sufficiently violent to break the solid band of the International tire. (Rec. p. 286, X-Q. 44, X-Q. 45.)

Defendant's witness Koenig, who did nothing but apply tires for two years before he testified and was familiar with the Grant type of tire for two and one-half years, says (Rec. p. 297) that he has known of cases of the breaking of the wires when the tire was caught in a switch or frog.

There, therefore, can be no question but that in actual use the side blows are frequently sufficient to break the wire. The strain put on the wire by the screw-driver is enough to lift it but not to break the wire. It, therefore, follows as a matter of inevitable conclusion that the side strains and blows are sufficient to tip the tire.

Remember, also, that when the tire of the Grant patent is tipped, it can, by reason of the shape of the tire, the location of the wires and the shape of the channel, restore itself automatically to its original position.

II.

Complainant's tests of tires of the Grant construction in actual use fully demonstrate that the tires yield and the tip under the influence of side strains.

Both Joseph P. Livermore (Rec. p. 760), complainant's expert, and A. S. Krotz, a skilled mechanic (Rec. p. 785), testify fully as to these tests.

We invite the Court to read the deposition of Mr. Krotz, beginning Record, page 781.

Mr. Krotz thoroughly tested the tipping action of a Grant tire by actually connecting the wires in the tire to a pointer which made a mark on a piece of painted glass secured to the rim of the wheel. Mr. Krotz fastened the pointers to the wires in three different ways.

The first way is shown in Figs. 1 and 2 of sketch No. 1 opposite page 782, in which the needle which marks the glass is fastened to a wire imbedded in the rubber tire and in contact with the bottom of the wires so as to be moved as the wires move. The second method was to attach the needle by a wire to one of the wires, as shown in Fig. 3 and Fig. 4. The third method shown in sketch No. 2, opposite page 784, was to attach the needle by suitable arms to a rod passing through the tire just above the wires and secured to the wires.

The wires in the tires, used in these tests, were hard wires stretched to their limit; in fact, several wires were broken in putting the tires on the rims, so strong was the pressure used.

The tires used were both of the complainant's construction and of the Firestone construction.

The vehicle, the wheel of which was equipped with these

tires and testing devices, is shown in the photograph opposite page 785, and the road over which it was driven is shown in the photograph opposite the same page.

The results of the tests are shown by the scratches on the plates, photographs of which are shown opposite pages 783, 784 and 785.

The plates show vertical scratches in the cases where the first two kinds of fastenings were used and horizontal curved scratches in the cases where the third kind of fastening was used, such scratches corresponding in all cases to the up and down movement of the wire with respect to the channel of the tire. These tests, therefore, show fully that in actual use the Grant tire is tipped and does yield laterally in the channel when it receives lateral blows and strains.

Mr. Cooper, whose business is to attach rubber tires (Rec. p. 786), testifies that he knows that the Grant tire tips, and corroborates the testimony given by Mr. Krotz as to the tests.

The fact that the Grant tire reseats itself after having been tipped is also fully established by these tests. The defendant argues that these tests should be disregarded, as they were not made in the presence of defendant's counsel, but the complainant offered to repeat the test at any time and place convenient to defendant's counsel, in order that he might verify the accuracy of the witnesses' statements. Defendant's counsel declined on the record to accept complainant's offer. (See Firestone Rec. p. 789.) The defendant has made no effort to contradict the facts proved in these tests. They, therefore, stand unchallenged on this record.

On the contrary, the defendant's expert Pond admits (Rec. p. 213):

> "The tests plainly showed a movement of the wire inwardly or toward the base of the channel, relatively to its normal position, as well as outwardly or from the base of the channel relatively to its normal position."

That the wires and tire so move up and down thus appears to be conceded by the defendant's expert, but he argues that this movement is not due to side strains but to the natural flexion of the rubber tire as it rolls along the ground, compressing the rubber so as to bring the wires nearer to the bottom of the channel opposite the point of contact with the ground and bulging out the rubber ahead of that point so as to raise the wire from the channel. (Pond, Rec. p. 217.)

If the wires do have this up and down or "wave like" movement when the wheel is rolling over a smooth road, it does not disprove that the tire does tip when it is struck a side blow or is twisted in a car track. On the contrary, if defendant's expert Pond is correct, the wires are very easily moved toward and from the bottom of the channel, and the rubber between the wires and the channel is very easily compressed and expanded.

Defendant's whole argument against the tipping of the Grant tire is based on the assertion that the rubber between the wires and the bottom of the channel cannot be further compressed if the hard wires are stretched tightly enough. Pond's explanation of the movement of the wires completely refutes this assertion, because if this rubber can be compressed by the wheel when traveling over a smooth road, it surely can equally be compressed so as to allow one side of the tire to be raised by a side blow or strain.

Moreover, we will admit that the movement of the wires and the flexion of the rubber, lifting it at times from the bed of the channel, may be possible. If it does exist, it is a decided merit in the Grant tire, which is so constructed as to permit this movement and to yield to the force causing it. A tire held solidly and rigidly in the channel, as were all the tires of the prior art, would resist this movement explained by defendant's expert, Pond, and would soon be torn and broken by this very resistance.

The Grant tires having the capacity for movement, as Pond asserts, would not be torn or broken by the forces causing this movement, but by yielding would withstand these forces and not be injured. The Grant tire is like the reed in Æsop's fable, which bending before the storm escapes injury and after the storm has passed springs back into place, while the sturdy oak standing rigidly is broken by the wind. For this same reason the Grant tire withstands the usage, shocks, blows, twists and strains which have proved fatal to all tires not built on Grant's principle.

III.

As further proof of the ability of the Grant tire to move and tip in its channel and cushion the lateral blows, the complainant tested two tires, one having ordinary commercial wires and the other having a specially hard wire, both strained to the limit in their application. The details of the application of the tires to the wheels, of the tightening of the wires and of the tests, are described fully in the deposition of Ernenwein (Rec. p. 49) and of Roberts (Rec. p. 56.)

Ernenwein testified:

> "Why, we put them into a vise, and get on a bench, the wheel setting in the vise, without being clamped, just loosely set in to show the tire set in a slot; a man got on the bench and twisted the wheel about the same as it would — something the same as it would get in use. After that we screwed the rubber tightly into the vise, letting the wheel lie over toward the back of the bench, possibly the top leaned over two feet from a perpendicular point. It showed the base of the rubber raised up to the top of the flange which the rubber was applied in."
>
> "Q. 24. In these two tests which you have described what part of the wheel was in the jaw of the vise?

A. The rubber tire was between the jaws.

Q. 25. Was the tire clamped tight in both tests?

A. No, sir. The first test the rubber was dropped in the vise freely so it rested on the edge of the flange on the jaws of the vise.

Q. 26. What extent, if at all, did the twisting and tipping of the wheels when the rubber was in the jaws of the vise, lift the wires out from the wheel rim?

A. Of course, we didn't measure, but to the best of my knowledge at that point it raised the wire a quarter of an inch.

Q. 27. How near did it lift the wire to the level of the rims of the channel on the wheel?

A. It lifted the wire so you could stick a penknife under the lower side of the wire on top of the flange of the channel.

Q. 28. When the strain on the tires was released by lifting them from the vise what happened to the rubber tires? Did they stay in their displaced position?

A. They did not.

Q. 29. What did they do?

A. With the exceptions of a slight chafing on the tire you would not know that . . . had been in the vise."

"Q. 32. I wish you would state whether the strains to which you put the tires in these tests were any greater or more severe than those to which tires are subject in use on the cabs, and under what circumstances would the tires receive such strains in use?

A. In this case in testing I wrenched the wheel out of the vise myself without disfiguring the rubber in any way with the exceptions of a little chafing. We have had wheels that have had rubber tires applied, come into our shop with pieces torn out of the rubber, which the drivers would claim were caught in car tracks. Other cases the tire has been completely torn

from the wheel. My judgment is that that is a harder test on the rubber than we made on these present wheels."

"Q. 52. Who witnessed these experiments that you have testified about?

A. Mr. Roberts, Mr. Philip Adams, *defendant's attorney*, Mr. Burjison, Mr. Bakewell and Mr. Stapleton."

Roberts testified:

"Q. 27. After these tires were applied to what tests were they subjected?

A. The rubber on the wheel was placed in a vise and the vise clamped up so as to grip the rubber and the wheel tipped away from the perpendicular so as to draw the rubber away from the channel, and it did so.

Q. 28. Was this done with each of these exhibits?

A. Yes.

Q. 29. State whether or not they were also put loosely in the jaws of the vise, and whether the wheel was then twisted to see what the effect would be?

A. The rubber was put in the vise loosely and the wheel twisted so that the rubber was drawn away from the base of the channel.

Q. 30. Please state what effect this pulling away or pulling on the rubber had upon the wires?

A. It displaced the wires from the position in which they were in before the test was made, by disturbing the rubber.

Q. 31. State as to whether or not the strain operated to lift the wires from their normal position?

A. Yes, it lifted the wires away from the position they were originally in when the tire was applied.

Q. 32. To what extent?

A. From one-eighth to a quarter of an inch."

"Q. 26. In your judgment, how did this strain to

which the rubber tire was subjected compare with the strains that a similar tire would receive in actual use in twisting out of car tracks, in butting up against low curb stones, or in being twisted around on a pivot when loaded or other strains that a tire receives in use?

A. The strain brought upon the rubber in the tests was, in my judgment, not so great as many tires receive in actual use. As evidence of this, tires are sometimes returned to us for repairs which have been torn and from which a piece has been torn out, and the rubber usually will show evidence of what has happened to it to cause the injury or mutilation."

The tipping of the tire in its channel, one side rising so much from the seat that the inner portion was exposed, is well shown in the photographs opposite page 75 of the record.

Every possible means, therefore, has been used to prove that the Grant tire is capable of tipping and moving in its channel and thus offering a yielding resistance to lateral blows and strains. This feature in itself is an entirely new mode of operation in a vehicle tire.

DEFENDANT'S CONTENTIONS AS TO TIPPING.

The defendant has introduced the testimony of a large number of livery men and hack men to the effect that they never saw a Grant tire tip in its channel. This evidence is absolutely immaterial. It is absolutely impossible to see the tipping of the Grant tire as the wheel is moving rapidly as the tire strikes the obstruction and is tipped thereby. None of these witnesses ever made any tests of any sort to see whether the tire would tip or not. This evidence proves nothing but that these witnesses did not see the Grant tire tip and did not know why the tire was such a good tire, but

they all, without exception, admitted that they are using the Grant tire extensively in their business to the exclusion of all other tires on cabs, light livery wagons, carriages and such classes of vehicles.

These hackmen know that the Grant tire is the best, but there is no reason that they should know why it is the best.

The defendant produced only one witness, Charles H. Knight, who had made any test whatever as to the actual tipping of the Grant tire in use. The test made by Mr. Knight proves nothing whatever. He applied a Grant tire with cement and ran the tire for about a week over the streets in Chicago. He testifies that the tire was held by the cement solidly in the channel after this use. This may prove either that the cement was strong enough to hold the tire in the channel for the short time during which the tire was used, or that if the tire had tipped it had restored itself to position before the cement had solidified. The latter possibility is shown by the fact that, as Mr. Knight admits (X-Q. 47, Rec. p. 455), the cement was not fully dried, even when the tire was exhibited at the time of taking his testimony. The test is entirely without probative value.

In connection with this test, it is pertinent to ask why the defendant does not cement all its tires solidly in the channels on the wheels. It would thus avoid, according to Mr. Knight, all possibility of any tipping action, and the tire would avoid the Grant patent. The defendant's conduct in persisting in the use of uncemented tires speaks louder than its assertion that it does not find any advantage in the capacity of the Grant tire to tip.

The defendant also calls attention to the fact that in some instances the Grant tires have rusted in the channel. This is absolutely immaterial, because the grip of the rust on the tire is so weak as to be easily broken by a blow from the hand, and this blow is much less than the side strains and

blows received by the tire in actual practice. The alleged rusting of a Grant tire in its channel can have no practical effect in preventing the tire from tipping and cushioning the lateral blows upon it.

Defendant's counsel seems to lay great stress on the testimony of the defendant's witnesses that, in many cases, the Grant tires are torn or cut so as to require their removal before the rubber is worn down to the flanges. It does not follow from this that the Grant tire has not the capacity for tipping, but it shows merely that the wear and tear on the tire from the side blows may have been greater than even the Grant construction can stand. It is not pretended that the Grant tire will withstand the effect of all side blows and strains, but only that it will withstand those side blows and strains more effectively than any other known form of tire, either in the art subsequent to Grant or in the art prior to Grant. This fact is abundantly proved.

The defendant tries to make something of the point mentioned in the opinion of the Court of Appeals for the Sixth Circuit, that the success of the Grant tire may be due to the use of better rubber and not to the combination of its parts. This contention is absolutely unsound. A good quality of rubber can be had by every rubber tire manufacturer in this country, and yet they all refuse to make any other than the Grant tire, and the public insists on using the Grant tire, although other forms of tires made out of equally good rubber are free to them to manufacture, and thus to avoid the danger of infringement. The persistent use of the Grant tire and the failure of competing tires, although all made of the same quality of rubber, is conclusive proof that the success of the Grant tire is due to the combination and the relation of its parts and not to the quality of rubber used.

The defendant's other suggestions, that the wide use and success of the Grant tire are due to its immobility and the

cheapness with which the channels can be manufactured, are equally fallacious. As has been abundantly pointed out, the main feature of the Grant tire is its mobility, not its immobility. If the form of channel with flaring sides used by Grant can be cheaply manufactured, so also can channels with straight sides or with converging sides be cheaply manufactured, and these latter forms are plainly outside the Grant patent and open to use by the public.

Defendant's counsel in the court below referred with much stress to the Pond drawing No. 2, in which defendant's expert, Mr. Pond, illustrated his ideas of the action of the Grant tire on smooth pavements, rough pavements, under light and heavy loads and when brought in contact with a car track. This drawing is of no probative value, being but a figment of the imagination of Mr. Pond. It represents nothing which Mr. Pond has seen and nothing which has occurred in actual practice.

Thus, the defendant's arguments, designed to show that the Grant tire is incapable of moving and yielding in its channel, are entirely unreasonable and without foundation.

The defendant says that the capacity of the Grant tire to tip and move in its channel was not urged by the complainant in the Illinois cases brought by the Rubber Tire Wheel Company against The Firestone Victor Rubber Tire Company. These cases never came to issue, and therefore the complainant had no opportunity to present this feature of the Grant patent to the court. The record before this court does not bear out the complainant's assertion, because the entire records in those Illinois cases are not in it. Only some of the depositions given on behalf of the defendants in those cases are made a part of this record. The evidence for the complainant in those cases is not before this court, and, for all that this record shows, the capacity of the Grant tire to tip might have been fully explained in the complainant's testimony.

The defendant also attempts to make much of Grant's testimony in the suits against the Columbia Pneumatic Wagon Wheel Company (Rec. pp. 577–609), arguing that as Grant did not lay stress on the capacity of his tire to tip he regarded it as an immaterial and unessential feature.

The silence of the Grant patent as to this capacity shows that the importance of the mobility of the Grant tire was not appreciated by Grant or his solicitors, and Grant's testimony suggests that Grant had not fully understood the true reasons for the success of his tire even as late as 1898, but, on the other hand, Grant's statements show that he knew of the capacity of his tire to tip, although he laid more stress on the structural character of his tire, which is all that the law required him to set forth in his patent.

On page 584 of the record, Grant, testifying in the Columbia case, plainly refers to the capacity of one side of the tire to be raised in the channel, that is, the tipping capacity.

He says:

> "I also find *on slightly raising the side of said tire*, the inside of metal flange is of the same shape and the angle caused by the sides of the unexposed and exposed sides of rubber tire are below the top of flanges of metal rim."

Grant frequently refers to the creeping of his early tires in their channels, and states that, in his opinion, it is a benefit for the tire to creep slightly. (Rec. pp. 630, 655.) If the tire creeps, it must be mobile in its channel.

Defendant's counsel also makes much of the fact that at one time Grant used common shellac for preserving the canvas on the lower side of the rubber. Grant testifies concerning this at page 651 of the record as follows:

> "We used cement at one time, but not for the purpose of keeping them (the tires) from traveling, but

for the purpose of preserving the canvas on the lower side of the rubber and *to assist in keeping the rubber tire from tipping over in the channel.*"

This testimony of Grant fully establishes the fact that Grant was aware that his tire did in fact tip although he did not appreciate the advantages of this capacity.

The use of "this cement, which was nothing more than common shellac" (Grant Rec. p. 651), was shortly afterwards abandoned and never resumed. (Grant Rec. p. 651.)

The defendant's final point is, that the Blosser & Kunkle patent No. 529,478 does not refer to the capacity of the Grant tire to tip. This is not surprising, as this patent is directed to an invention in the devices for holding the channel, the felly and the spokes together, and has nothing to do with the kind of tire employed on the wheel. The patent shows incidentally in Fig. 2 a cross-section of a tire resembling that of Grant. The defendant's argument that the Grant tire must be denied the advantage clearly proven to be inherent in it of its capacity to tip and yield to lateral strains, blows and stresses, because the Blosser & Kunkle patent, which incidentally illustrates the Grant tire, says nothing about this capacity, shows the absurd length to which the defendant is obliged to go in order to support its theory.

Even if the mobility of the Grant tire in its channel were an after discovered property which appeared only after the tires had gone into successful commercial use and had not been fully appreciated by the patentee or explained in its patent, this is rather a cause for sustaining the patent than for defeating it. The authorities which establish this point of law are referred to beginning *infra* page 66.

THE OPINION OF THE COURT OF APPEALS FOR THE SIXTH CIRCUIT.

The Court of Appeals for the Sixth Circuit held the Grant patent invalid, because on the record before it, it found that the capacity for tipping in the Grant tire was not inherent but depended upon the tension with which the wires were applied. Whether or not this finding was correct on the facts in that case is not important, because in the case at bar it has been proved, beyond the shadow of a doubt, that no matter how tightly the wires are applied the Grant tire can tip in its channel and cushion the side blows and strains.

In its opinion the Court of Appeals for the Sixth Circuit said (116 Fed. 374):

> "It is very plain that the degree, if not the very existence, of this capacity for 'side tipping', depends upon the tension of the retaining wires. To tighten the wires to their utmost tension must in the very nature of things compress the rubber beneath them as much as its elasticity will permit. It must therefore follow that Grant's retaining wires must not be tightened to the highest tension of the wires, for, if that is done, there can be no beneficial yielding of either rubber or wire under a violent lateral strain, and either the rubber must be cut by the wire, or the wire break, before there can be any 'rising' of the rubber tire on one side to meet such strain."

Basing its conclusion on this finding of fact, which may have been justified by the record before it, but which the present record shows to be altogether erroneous, the Court of the Sixth Circuit found that the capacity for tipping was not inherent in the Grant structure, and, as the Grant patent failed to point out how tight the wires should be drawn in

order to secure this beneficial tipping, determined that the patent was invalid. The Court said (p. 376):

> "We learn now that this capacity for any beneficial yielding is dependent upon the wires being properly adjusted originally, and that this proper tension depends upon the right judgment of the workman. If this tipping capacity had been pointed out, and even this indefinite direction given by the patentee as to the mode of securing that operation, the patent might possibly be saved, though this we need not consider. . . . Eliminating this alleged new feature, we are unable to find in Grant's combination any new mode of operation or any new result."

We have already pointed out fully in this brief (beginning *supra* p. 47) just how the Grant tire, whether of the complainants' or of the defendant's construction, tips when struck or twisted sidewise, and we have fully shown that this capacity for tipping is present when the wires are applied as tightly as it is possible to do so without breaking them (*supra* p. 47). In the Goodyear case before the Court of Appeals for the Sixth Circuit this fact was not proved, and it was not proved that the defendant's tire in that case was applied with the wires stretched to their utmost capacity. In the case at bar the wires in the defendant's tires are stretched to their utmost capacity, and yet the tire is capable of yielding and tipping in its channel, and the same has been proved of the Grant tire made by the complainants.

It is clear from the opinion of the Court of Appeals for the Sixth Circuit that if the incompleteness of the record had not caused it to err on this question of fact it would have held the Grant patent valid, for the opinion admits as correct the rule of law that, if the patentee describes his invention so fully that those skilled in the art can practice

it, he is entitled to all the benefits and uses that are inherent in the patented structure. The court said (p. 375):

> "If this capacity for side movement be a beneficial function plainly inherent in Grant's combination and arrangement of old parts in relation to each other, and not a mere 'obscure property lurking in some accidental corner of his device', it was not essential that the patentee should point it out as one of the advantages of his structure. This is because he has invented a machine, structure or manufacture which includes in its necessary mode of operation the function in question, and, whether the inventor knew or not the full measure of the beneficial functions of his structure, he is entitled to all the uses of his invention."

In thus stating the law, the court simply followed the rule laid down in *Eames* v. *Andrews*, 122 U. S. 40, in which this Court sustained a patent for a driven well, which described fully the manner of driving the well, but did not explain the mode of operation by which the water ran into the well. This is the same situation which is met in the case at bar where the Grant patent describes fully and accurately the structure invented, but fails to describe one mode of operation by which its great commercial advantage is secured.

In *Eames* v. *Andrews*, as in the case at bar, the defendant contended that the patent was void for failing to disclose the principle of operation, but the court disposed of this argument (p. 55) as follows:

> "It is to be observed that the scientific theory and principle, the application of which is supposed to constitute the invention of Colonel Green, are not set forth either in the original or reissued patents. This feature was commented upon by Mr. Justice Blatchford

in *Andrews* v. *Cross*, 19 Blatchford, 294, 305, as follows: 'It may be that the inventor did not know what the scientific principle was, or that, knowing it, he omitted, from accident or design, to set it forth. That does not vitiate the patent. He sets forth the process or mode of operation which ends in the result, and the means for working out the process or mode of operation. The principle referred to is only the why and the wherefore. That is not required to be set forth. Under § 26 of the act of July 8, 1870, 16 Stat. 201, under which this reissue was granted, the specification contains a description of the invention and of 'the manner and process of making, constructing, compounding, and using it,' in such terms as to enable any person skilled in the art to which it appertains to make, construct, compound, and use it; and, even regarding the case as one of a machine, the specification explains the principle of the machine, within the meaning of that section, although the scientific or physical principle on which the process acts when the pump is used with the air-tight tube, is not explained. An inventor may be ignorant of the scientific principle, or he may think he knows it and yet be uncertain, or he may be confident as to what it is, and others may think differently. All this is immaterial, if by the specification the thing to be done is so set forth that it can be reproduced.'"

In *Dixon-Woods Co.* v. *Pfeifer*, 55 Fed. 390, the Court of Appeals for the Second Circuit sustained the complainant's patent, saying (p. 395):

> "His patent described clearly enough the way in which bars and the operative mechanism should be constructed and operated, and the glass should be conveyed through the leer. He did not know, or he did

not tell, why the new method would produce better results. He simply told how to construct a machine which carried the glass through the leer on a level, and saved much breakage; but he ought not to lose the statutory benefits which would certainly belong to him if he had seen and described the philosophy of his machine accurately."

In *Cleveland Foundry Co.* v. *Detroit Vapor Stove Co.*, 131 Fed. 853, C. C. A. Sixth Circuit, the Court of Appeals for the Sixth Circuit sustained the patent in suit, although the specification did not describe the scientific principle on which it operated, saying (p. 855):

"And it may be that the expert witnesses have not in all respects correctly apprehended it. But if the fact be that his construction does effect the results, and they are beneficial, he is none the less entitled to the benefit of his invention though he may not have correctly understood the principles of its operation."

In *Van Epps* v. *United Box Co.*, 143 Fed. 869, the Court of Appeals for the Second Circuit sustained a patent for a screen-plate in a paper pulp machine. The court said (p. 872):

"The language of the patent fails to state any theory of the patentee as to the presence of air below the screen-plates. But where a patent discloses means by which a novel and successful result is secured, it is immaterial whether the patentee understands or correctly states the theory or philosophical principles of the mechanism which produces the new result."

In *Westmoreland Specialty Co.* v. *Hogan* (C. C. A. Third Circuit), 167 Fed. 327, the court sustained a patent for a salt dredge or cellar and said (p. 328):

"But the mere failure of a patentee to realize all the benefits and possibilities of his invention is not fatal. The after-discovery of unsuspected usefulness in a disclosed apparatus, far from detracting from its value, may serve to enhance it. It is the benefits which test, use, and time unfold that really determine merit. It is this after-test, the test of use, that proves the worthlessness of the great majority of patents and establishes the value of the few."

THE OPINIONS OF THE COURT OF APPEALS FOR THE SECOND CIRCUIT.

The Court of Appeals for the Second Circuit found, both in the Firestone case, 151 Fed. 237, and in the case at bar, 162 Fed. 892, that the capacity for tipping was inherent in the Grant patent, even if the tire was applied with the wires stretched to their utmost capacity, and that the Grant patent was valid.

In the Firestone case the court said (p. 238):

> "Grant's claims cover combinations composed of elements which, when considered separately, were all old, but which were combined by him to form a structure, which, for the first time, placed in the hands of vehicle owners a perfect rubber tire. From the crudities, oddities, total failures and partial successes which had preceded him he constructed a tire which became popular almost from its inception. This was not the result of chance or the haphazard selection of parts; his success could only have been achieved by a careful study of the scientific and mechanical problems necessary to overcome the defects which rendered the then existing tires ineffective and useless. The problems demanded the exercise of faculties far above those possessed by the skilled mechanic. Few patents have received such immediate and well-nigh unanimous recognition. For years carriage manufacturers had

been making strenuous efforts in this country and in Europe to secure a practical rubber tire. The moment Grant's structure appeared it was adopted by all the large manufacturers and to-day it is no exaggeration to say that no successful rubber tire can be made without embodying the distinguishing features of the Grant patent. Persistent efforts have been made to evade it but without success. The tire described and claimed in the Grant patent is the standard rubber tire of to-day. This popularity may be accounted for in part by the financial ability of the owners of the patent to promote sales, but it was a most inconspicuous part. The hard-headed men of trade do not place themselves in a position where they must accept the alternative of an infringement suit or the payment of license fees for the use of an article, when an equally good article may be had for nothing. It should be and is the desire of the court in approaching the consideration of a patent for a structure which has thus won a position of unchallenged supremacy in the commercial world, to endeavor to sustain rather than defeat the claims. The combination of the patent operates, we think, to produce a new result or an old result in a manner which is a vast improvement over anything in the prior art. The Grant tire has the capacity, which no other possesses, of readjusting itself, after yielding to severe lateral strain, without tearing or abrasion of the rubber or injury to any of the parts.

"The Circuit Court of Appeals found that the new mode of operation which produces this result is not mentioned in the specification or inherent in the combination but depends for its discovery upon the ingenuity of experts. Recognizing the rule that one who has invented a structure which cannot be used without including the function which produces the new result,

is entitled to all the uses of his invention whether known to him or not, the court says:

"'If this tipping capacity had been pointed out and even this indefinite direction given by the patentee as to the mode of securing that operation, the patent might possibly be saved.'

"It now appears that the feature which secures patentability is inherent in the patent, and the specification is so clear and explicit that no intelligent mechanic can follow Grant's directions without securing the tipping action which inheres in no other tire. This feature is neither an accident nor 'an obscure property'; it exists in every wheel on which is mounted a tire which follows the teaching of the patent. In view of this new aspect of the case we have no reason to doubt that on the present record the Court of Appeals of the Sixth Circuit would reach a result favorable to the patent.

"The complainant's expert says:

"'It is absolutely impossible to adjust the tension of the wires, so that this yielding capacity will not be exhibited in the tire.'

"We are convinced, in view of the new testimony, that he is correct. The specification is addressed to those skilled in the art; it is enough that they understand it. Had the patentee attempted to point out the minute details of the elements making up his combination — such as the quality and degree of elasticity of the rubber, the material, size, strength and tensility of the wires and the exact amount of force needed to draw the wires together, he would have found himself surrounded by difficulties even more serious than those which now confront him. He chose to leave these details to the intelligent operator with the assurance that such a one would possess sufficient knowledge to

draw the wires tight enough to hold the rubber firmly in the channel, but not tight enough to break them. Nothing more was required, for a tire so secured would necessarily have the capacity of reseating itself when subjected to unusual lateral strain and would infringe the claims. The entire prior art was before the skilled workman to the same extent as if written in the Grant patent, and, with this knowledge, it is hardly possible that he could set the tire so that it would fail to perform the functions referred to, unless he deliberately purposed to make a failure. On the one hand, he would know that he must not draw the wires tight enough to break them, and, on the other, that he must draw them sufficiently to hold the tire snugly in the channel. Ordinary common sense would teach him to do this, and if he neglected to exercise it he would find that in one case the wires would break and in the other that the tire would rock, and, if subjected to any unusual jolt, would roll out of the channel. That the capacity for readjusting itself when subjected to lateral strain is inherent in the Grant tire seems perfectly plain, and was demonstrated at the argument even by hand pressure applied to the tire at a point where the rubber had been cut down so as to expose the wires. Indeed, the defendant's expert says:

> "'There is no doubt that when lateral pressure is applied to one side of the exposed portion of the tire, there is a tendency to roll the tire out of the channel. The element which materially resists this tendency is that retaining-wire on the side to which the pressure is applied. If this wire is sufficient to resist the strain, the tire cannot roll out of the channel; and the function of the other retaining-wire, at the opposite side of the tire, is simply to hold that part of the tire in its place, in order that

it may be prepared, in its turn, to receive lateral thrust from the opposite side.'

"Without discussing the subject further we are satisfied that the description of the patent is sufficiently full, clear, concise and exact to enable a person skilled in the art to make the Grant tire. We are also convinced that the new and useful tipping and reseating feature is inherent in the structure and that it was not necessary to point it out specifically, for the reason that no intelligent mechanic in the rubber tire art could follow the teachings of the patent without producing a tire possessing this function."

In the case at bar the Court of Appeals for the Second Circuit replied to the defendant's arguments as follows (Rec. p. 682):

"The impossibility of proving or disproving in any satisfactory manner the existence of this tipping tendency by the observation of the vehicle in actual use or the examination of a worn-out tire, will be admitted after a moment's reflection. The human eye cannot detect the movement of the tire when driven rapidly against a trolley rail or other obstruction at an angle of 45 degrees. So too a worn-out tire with cuts and abrasions along its entire periphery may have the tipping capacity in question. The fact that tires have been produced in court which were rusted in the steel channel, is not important unless it be proved that they were subjected to severe lateral strain.

"A tire used on asphalt pavements or on smooth park roads would probably remain in place if but one wire were used. We do not lose sight of the fact that the testimony shows that many of the tires from Chicago received rough usage but this testimony avails little in face of the experiment which showed us the bottom of the tire rolled up by lateral strain and re-

seated the moment the strain was removed. This record presents nothing new which would warrant us in changing our former decision.

"Another volume of 500 pages has been added to the library which has accumulated during the last ten years through the efforts of many defendants who seem determined to use what they, in effect, assert to be a useless device. The indomitable persistency with which these people have fought for the right to use the Grant tire is more persuasive evidence of its merits than the opinions of experts.

"If the Willoughby, Latta and other tires are as good as Grant's why do not these defendants use them? The almost frantic efforts which have been made to use the Grant tires are inconsistent with the argument that they show no inventive genius and we are more and more convinced that we were right when we said that 'no successful rubber tire can be made without embodying the distinguishing features of the Grant patent'."

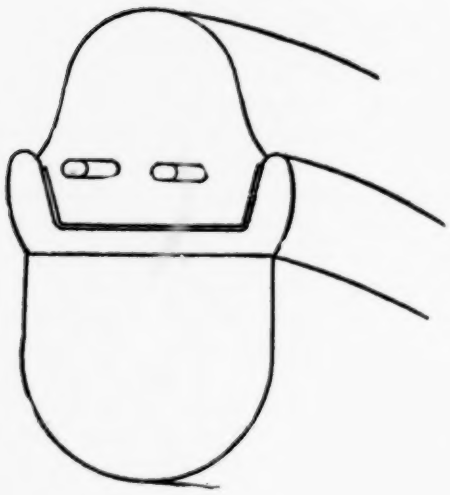
INFRINGEMENT.

The fact of infringement was proved by the sale of a rubber tire by the defendant's agent in the city of New York. This tire is produced in evidence, and is marked "Complainant's Exhibit Defendant's Rubber Tire". The tire was assembled and sold by the Diamond Rubber Company of New York, February 28, 1907, some months before the bill of complaint was filed. (R. pp. 9, 10, 28 and 21.) We show herewith a cut of the cross-section of defendant's rubber tire, which shows all the elements of the claims in the patent with the exact limitations specified by the claims.

In the words of Grant's first claim, the defendant's tire is in combination: —

"a vehicle wheel having a metallic rim with angularly

Deft's Rubber Tired Wheel.



projecting flanges to form a channel or groove with tapered or inclined sides."

It is —

"a rubber tire, the inner portion of which is adapted to fit in said groove or channel and the outer portion having sides at an angle to the inner portion, the angle or corner between the outer and inner portions being located within the outer periphery of the flanges."

It has —

> "independent retaining-wires passing entirely through the inner portions of said tire and also within the outer peripheries of the flanges."

These three elements, the metallic rim, the rubber tire and the independent retaining wires, are all "substantially as described" in the Grant patent.

The defendant's tire, therefore, is substantially identical with the specific tire described in the Grant patent and infringes the first claim thereof.

The second claim of the Grant patent is for the same elements as the first claim, with the addition of "a reinforcing strip of fibrous material placed at the bottom of said tire and wholly within said flanges". This reinforcing strip the defendant's tire also has. It, therefore, infringes the second claim of the Grant patent.

There is no substantial contention that the defendant's tire does not infringe the Grant patent. The distinctions which the defendant's expert is able to point out are not substantial differences, but are of the most trivial nature. He finds that the angle between the exposed and unexposed portion of defendant's tire is 162°, whereas the angle in the Grant patent is 137°. This is certainly immaterial, as all the advantages of the angle in the Grant tire are found in the defendant's tire. The claims do not call for any specific angle, but merely that there should be an "an angle". The defendant's expert also says that the tops of the holes for the wires "are just about on a line connecting the outer periphery of the flanges". Even if this were so (and it does not appear to be the fact from an inspection of the tire), it is not denied that the retaining wires are "within the outer peripheries of the flanges", and this is all that the claim requires. These flimsy differences are not worthy of further consideration.

The defendant's tire, therefore, is a clear infringement of the Grant patent.

The defence of non-infringement was not seriously urged in the courts below. Judge Holt, in his opinion (Rec. p. 671), said:

> "Of course if your defence was that this defendant does not infringe, that would be an entirely different question, but the only question argued here is as to the validity or invalidity of the patent."

CONCLUSION.

In conclusion we respectfully submit:

First, that the Grant tire is a new and useful combination of elements which has superseded all other forms of tires for certain classes of vehicles, and which has been widely copied by all tire manufacturers and users of solid rubber tires. All other forms of tires for these classes of vehicles have been discarded.

Second, that the beneficial function of the capacity of the Grant tire to cushion lateral strains and blows by tipping and yielding its channel has been fully demonstrated and proved in the record before this Court.

Third, that this capacity for tipping in the Grant tire is inherent in the tire, and is present even if the wires are strained to their utmost in applying the tire. The Court of Appeals for the Second Circuit found this to be a fact on the record before this Court.

Fourth, that the Court of Appeals for the Sixth Circuit, because of the incompleteness of the record before it, was lead into the error of finding that the capacity of the Grant tire to tip depended upon the tension of the wires, and therefore its decision, based on that finding, that the Grant patent was invalid was wrong.

Fifth, that the defendant's tire infringes the Grant patent.

We respectfully submit that the decision of the Court of Appeals for the Second Circuit should be sustained and the decree that the Grant patent is valid and infringed should be affirmed.

C. W. Stapleton

FREDERICK P. FISH,
STALEY & BOWMAN,
J. L. STACKPOLE,
Counsel for Respondents, Complainants.

ADDENDA.

The patents of the prior art are discussed by the complainant's expert, Mr. Livermore, in the record, as follows:

Beirsmith,	No.	424,452,	Rec. p.	752
Coops,	"	20,678,	"	757
Elliott,	"	440,701,	"	737
Elliott,	"	440,702,	"	740
Everett (Swiss),	"	8,120,	"	749
Grant & Jeffrey,	"	470,483,	"	748
Green,	"	169,100,	"	732
Kearsley (British),	"	4,352 of 1883,	"	756
Kelley,	"	321,819,	"	750
Kelley,	"	362,514,	"	750
Latta,	"	341,811,	"	745
Lenton (British),	"	14,812 of 1890,	"	754
Owen,	"	365,091,	"	755
Rodgers,	"	539,826,	"	738
Timberlake (British),	"	20,706 of 1890,	"	737
Welch (British),	"	14,563 of 1890,	"	735
Willoughby (British),	"	5,924 of 1892,	"	743
Willoughby (British),	"	18,030 of 1892,	"	753
Woodward,	"	443,735,	"	750